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What's in this issue-

Work in the Caterpillar medical department is expedited by a well equipped laboratory

Nothing is more important today than for industry to have agreeable relations with its employees. Some companies are doing a fine job of **supervising employment, safety activities, training programs.** To be specific, Caterpillar Tractor is doing things that might profitably be done by other companies. L. B. Neumiller, Caterpillar's vice-president, outlines the program on page 631.

If you think that **butt welding of steel channels into rectangular tubing** is a simple production job, just try it. L. O. Koven & Bro., Inc., did try it with notable success. Find out how they did it on page 634.

Automobile manufacturing requires extreme accuracy. Accuracy, however, must be constantly checked. At Lincoln a system using **special gages and machines for measuring close tolerances** has been developed. It is described on page 640.

Short cuts for the small shop—how to move heavy machinery around the shop, a handy way of carrying Prussian blue for the machinist, how to remove grease and dirt at little expense from small parts. You will find them on page 643.

Do you ever have to **dress abrasive wheels for grinding work to special shapes** in a surface grinder? A special fixture for the job is described on page 650.

Perhaps you don't know that **smooth contours on office equipment parts can be produced by shaving.** Much depends, however, on using correct principles of tooling. Walter Kassebohn tells you how to do it on page 636 in an article on shave dies and their application.

All the work in a machine tool builder's plant doesn't end with completion of the machine itself. **Cleaning, painting, greasing and crating** must be given careful attention. A picture story of "good packaging" is told on pages 644-646.

Proper determination of manufacturing costs and establishment of time standards for wage incentive purposes are problems constantly with shop superintendents and operators of jobbing shops. Time studies help solve these problems. On page 653 are the latest **standard time data, based on Wright Aeronautical's experience, on thread grinding.**

Something new in machine tools is a **hydraulic hobbing machine.** It is fully described on page 655. In fact, you will find nine pages of new equipment descriptions starting on that page. This is a regular every-issue service to our readers.

If you ever had to operate the hand wheels and levers on machine tools, you will appreciate the advantages of **free-turning handles.** For descriptions of various types of such handles, together with line drawings, turn to page 651.

Is it advisable to give the foreman a blanket order for small maintenance jobs or should each job be done on a separate requisition for cost control purposes? This problem is discussed in the Round Table on page 649.

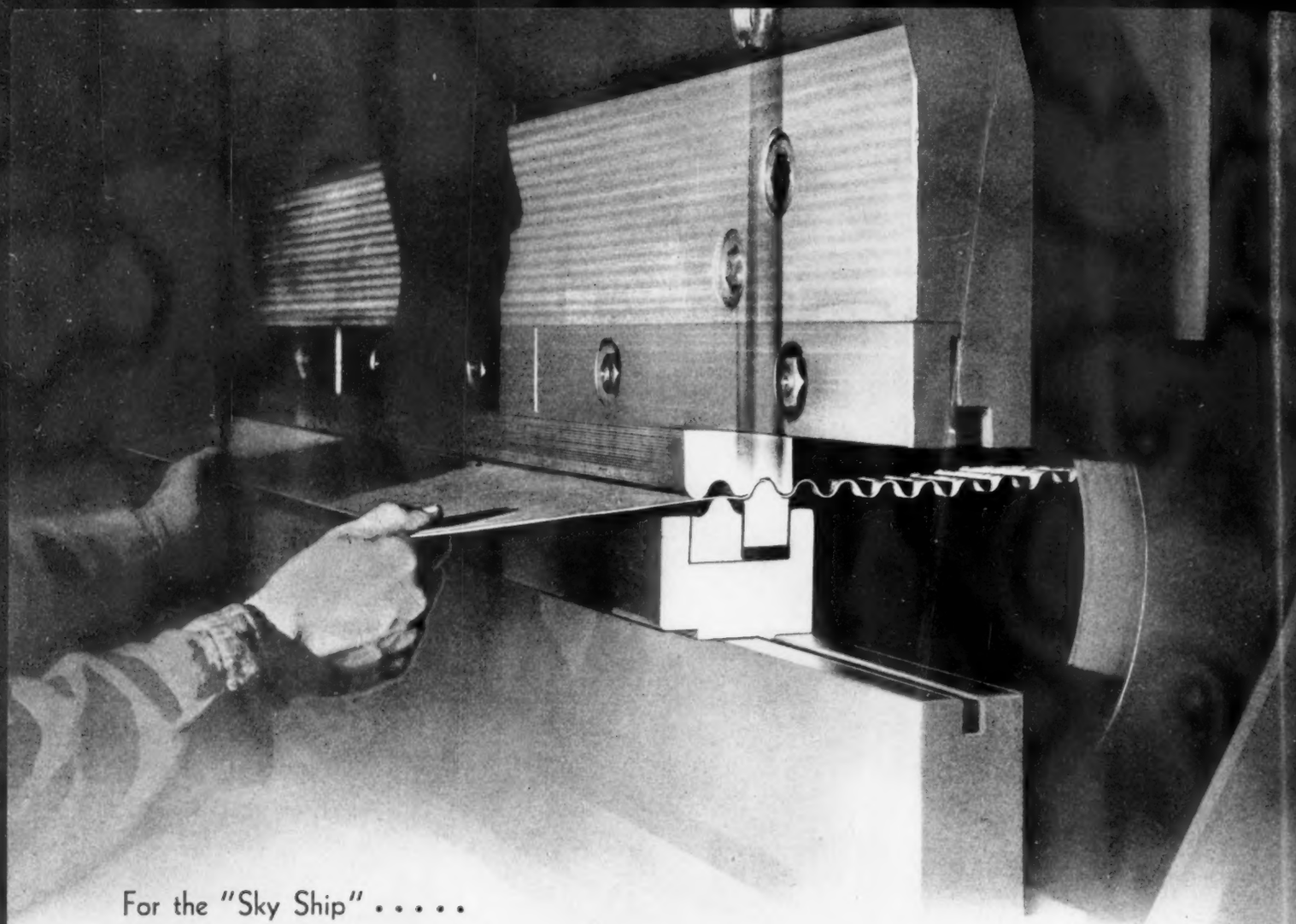
COMING

C. W. Hinman

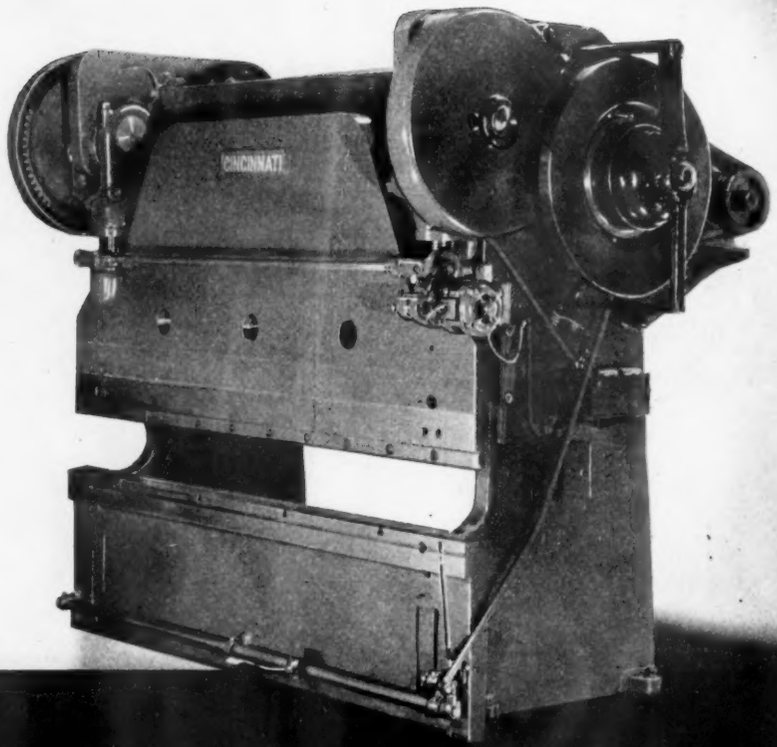
A new Hinman series on the design and operation of press tools begins in the next issue. The proper use of die-design principles depends on knowledge of the more common types of presses. For this reason C. W. Hinman, author of a previous series on "Steps in Practical Tool Design" published last year, and the editors of *American Machinist* have prepared ready reference material consisting of short descriptions and specially-made Lucas-type black and white illustrations. The first installment tells how to select presses. The second installment will outline how to choose press attachments. In later installments Mr. Hinman will discuss principles of die design.

Just as a distinguished committee of Americans is getting ready to study Britain's labor relations policies, we bring you a comprehensive article on labor conditions in England. It tells you to what extent labor unions are responsible, how arbitration is working and how negotiations between management and labor differ there from here. The article is written by a trained observer who visited England recently and talked with many industrial and labor leaders.

Flame hardening is now used by a leading company to harden lathe beds. The why and the wherefore of the process are told in a special article written by a staff member who visited the plant and saw the process at work.



For the "Sky Ship" . . . . .
Corrugating 12 ft. Dural sheets
. . . edges must line up after
forming . . . a striking example
of the performance of
Cincinnati Press Brakes. . . .



THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS · SHEARS · BRAKES

AMERICAN MACHINIST

ESTABLISHED 1877

F. H. COLVIN • K. H. CONDIT • BURNHAM FINNEY, Editors

Everything to Gain

AMERICAN industry is on trial for its life. If the system of free enterprise as we have known it in the United States is to continue, industry must keep its house in order. It must tell its story to the public so convincingly that the American people will not be lured by economic preachments calling for government domination of business. As one experienced observer has put it, "If private enterprise in America is to survive, the people must be convinced that industry, under reasonable government regulation, is more in their interest than any conceivable form of planned economy."

The industrial corporation must be "the good neighbor" in its own community and a good citizen in the nation. It must take into consideration the public viewpoint in its policy-making. It is with a sense of satisfaction, therefore, that we note the unorthodox action of the Johns-Manville Corporation in electing to its board of directors Dr. Walter Jessup as a representative of the public.

Dr. Jessup is president of the Carnegie Foundation for the Advancement of Teaching. He is an educator of national repute. In notifying him of his election, Lewis H. Brown, president of Johns-Manville, wrote, "American business is today confronted not only with new social responsibilities which it must discharge, but with new concepts that profoundly alter the relationships of business to its stockholders, to its employees, the government and the general public. Determination of industrial policies, as well as consideration of great national economic questions, must more and more include not merely the strictly economic factors on which business men are accustomed to rely, but on wholly new elements of great importance. The making of profits is, of course, fundamental to all soundly managed enterprises, but the measure of corporate success goes beyond profits and now includes service to the community and nation as well."

IT IS SO EASY for the public to misunderstand industry and its motives. There is so much chance for management to do something inadvertently which alienates public opinion or which might be misinterpreted by the public. It is in need of a public defender. Inclusion of a representative of the public on a board of directors, therefore, might well be considered as a safety measure by other large companies. Industry has long proclaimed that it has nothing to hide. Its leaders are advocating taking the mystery out of business. What better way to make good on its announced convictions than to invite a disinterested progressive-minded citizen to sit in at its inner council meetings?

We hope that other companies will take up the Johns-Manville idea. Or perhaps they can devise other means just as effective which will be tangible proof of their awareness of their social responsibility and of their desire to improve their public relations. The quickest way for industry to allay suspicion and to create a favorable public opinion is to take the public into quasi-partnership. By moving rapidly in that direction industry has everything to gain and nothing to lose.

Gaging Business

DROOPING spirits have definitely revived in the metalworking industries because of the bracing effects of the stock market upturn, of prospective government expenditures for pump-priming and for national defense, and of exhausted inventories in many lines which soon will have to be replenished. Machine tool sales, still supported by foreign commitments, have sagged again domestically, but a slight improvement is looked for in August.

Steel mills, suffering temporarily from hesitancy on the part of buyers following the lowering of prices, feel that some major users, particularly automotive companies, will be in the market again next month.

Farm implement builders too believe that the harvesting of large crops plus government disbursements will aid their sales in the fall. Automobile makers are heading into their annual tooling period, with output down to less than 100,000 units a month, but better prospects for fall have cheered Detroit. Definitely on the bright side are reports of an increase in shipbuilding operations of 139% over last year and of high production by aircraft companies.

CHICAGO—Structural steel demand and sales to miscellaneous users are partly offsetting lack of steel tonnage from automotive, railroad and agricultural implement companies. Continental Steel at Kokomo and Milco at Milwaukee have been doing unusually well. Tractor and farm implement makers are closing plants or operating on reduced schedules this month to cut inventories and to give employees paid vacations. However, considerable improvement in production is expected in the fall because of good crop prospects. Electric tool sales are trending upward, but small tool manufacturers report business very slack. Railroads are rehiring employees and increasing hours per week at some shops to recondition cars in anticipation of large volume of grain and fruit to be handled soon. Many machine tool inquiries are pending, but little is yet being closed. Foreign orders have sustained output of Rockford Machinery Builders at a good rate.

CLEVELAND—There has been a slight increase in industrial employment and the general pessimistic tone recently prevailing no longer exists. Auto parts factories are retooling in preparation for 1939 car releases. Machine tool sales continue to recede, but a turn for the better is looked for next month. Foreign inquiries are good. Winton Engine is reported booked ahead at capacity for months with diesel engine orders.

SAN FRANCISCO—While the quick upward swing in business feeling has struck the West with full force, no sizable machinery inquiries are out. Chance that the Navy may retool its Mare Island yards appears good. Biggest western project is $35,939,450 contract for Shasta Dam, key unit in California's Central Valley program.

NEW ENGLAND—Widespread improvement is under way in textiles, the power industry, retail trade and diverse manufacture. Machinery makers have had little new business, but are preparing for considerable government buying, particularly of large tools, for Navy yards and arsenals and for private shipyards. Steam turbine makers are working on many industrial inquiries.

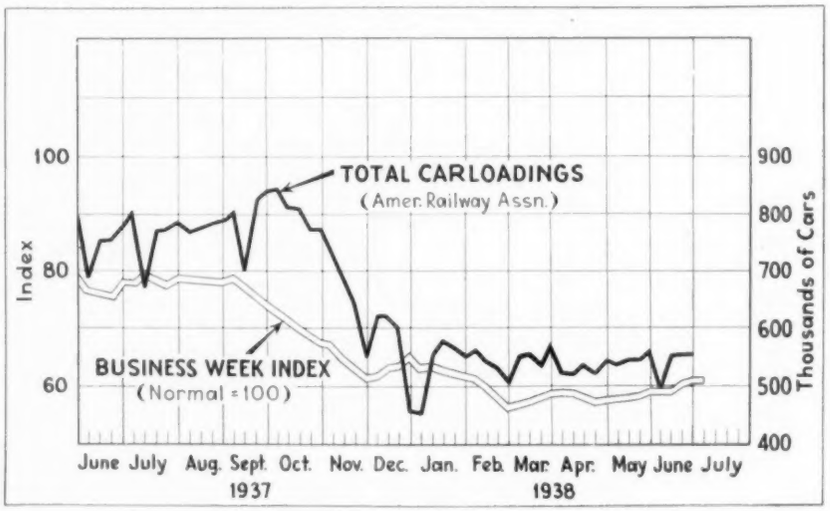
NEW YORK—There has been a little more machine tool buying, but the total volume is only slightly better than in 1932 and 1933. Dealers are inclined to pass over July and August and place their faith in September. General Electric's orders received during the second quarter were 44% below those in the same quarter a year ago.

CINCINNATI—Receipt of new foreign orders has helped to bolster backlogs of machinery builders. Domestic bookings, however, continue small. Several companies closed down last week for annual vacations with pay for employees. Indianapolis reports machinery sales slow and inquiries scarce.

PITTSBURGH—Reduction of steel prices coupled with readjustment of the steel pricing system has temporarily stopped steel buying until users can appraise the situation and can be sure that prices are at bottom. Steel mills look for some automotive tonnage and awards from government projects next month. Industrial operations in this district have advanced slightly. Machine tool sales remain poor. Sentiment here as elsewhere is much happier than it was a few weeks ago.

CARLOADINGS VS. GENERAL BUSINESS

Carloadings experienced a sharp dip in early June as a consequense of slackened operations coincident with the May 30 holiday, but since then they have resumed a slight upward drift in company with general business.



Complete, modern X-ray and physio-therapy rooms are included in the small hospital maintained by the medical division

"Man Handling" at Caterpillar

Seven divisions have been coordinated to form an employees service group, which includes supervision of employment, medical, safety and training activities

L. B. NEUMILLER
Vice-President, Caterpillar Tractor Company

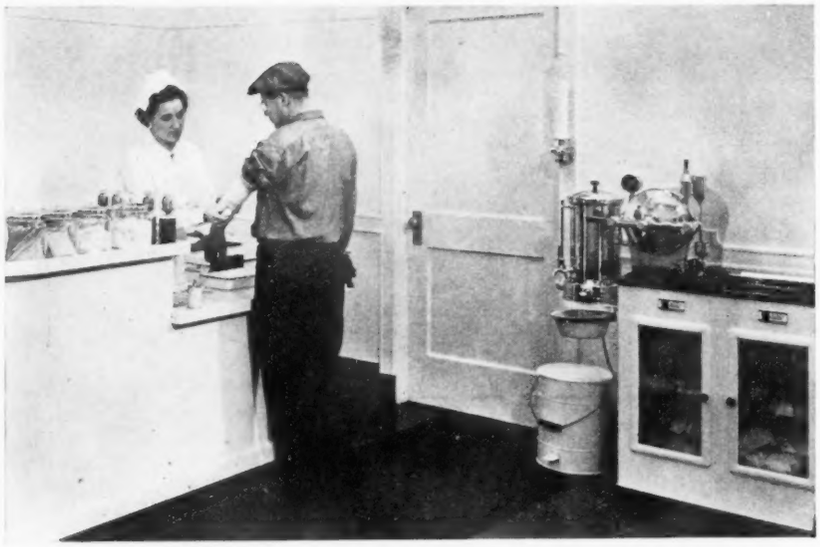
ORGANIZED on the premise that each worker should be given full opportunity to feel that he is helping turn out a finished machine of which he can be proud, the new industrial relations department set up by Caterpillar in its Peoria, Ill., plant has charge of all employee relations and activities. During the past year the company has correlated seven divisions under one head and has provided a group of offices for the department that includes arrangements for employee organizations. Special arrangements have been made in the personnel division for handling interviews and giving the new employee a complete picture of his place in the organization.

As indicated in the accompanying chart, this department is under the direct charge of a vice-president and a director of industrial relations. The divisions are: (1) personnel, (2) medical, (3) safety and sanitation, (4) insurance, (5) factory training, (6) factory publications, and (7) restaurant. A trip through the regular employment channels with a new man will show how some of divisions function.

Suppose, for instance that Smith Jones walks in through the employment entrance in search of a job. First, he goes to the information desk and talks with the clerk. When work is available and an interviewer has an unfilled docket, the applicant is asked to go to a waiting room. However, should the interviewer's docket be filled, Jones is given an interview pass and instructed to return at a stipulated time.

This plan has been found to result in less inconvenience to the applicant and provides a schedule for the two interviewers who check employment qualifications. When passed by the interviewer, Jones is taken to the medical division where he is given a thorough physical examination. This includes a blood test and urinalysis, which are made by a technician in the division's laboratory. Where the examination shows that the applicant is not fit for a certain type of job, every efort is made to assign him to work in keeping with his physical condition.

While in the medical division



A number of first aid stations are located in various parts of the Caterpillar plant, in addition to this unit near the offices of the medical division. Employees are instructed to have even the seemingly trivial cuts and scratches properly dressed

Jones learns that there are first aid stations throughout the plant and that what amounts to a small hospital is maintained in the division's main offices. On his way in he noticed a door marked "Physiotherapy" and across the hall a series of rooms labeled "Medical Division." If he is lucky he will not see much of this place, but it is a comfort to know that it is completely equipped with the most modern X-ray apparatus and all first aid facilities.

From the medical division, Jones goes to the insurance division where the group and workmen's compensation insurance plans are fully explained. Since the formation of the company, some thirteen years ago, an entirely voluntary plan of group insurance has been in effect. Almost 99 per cent of the employees now are carrying this form of insurance, for which the company pays an appreciable percentage of the premium. Present total of some $50,000,000 worth of group insurance is being carried.

The safety and sanitation division next is visited. Jones is shown a completely equipped store where safety shoes and cover-alls are stocked and sold at cost. He sees and is told the purpose of various types of safety clothing and protecting appliances which can be obtained through a checking system. Proper use of goggles, helmets, pads, boots, aprons and respirators are explained on the premise that he does not want to be hurt, so all these safeguards are offered to help him take care of himself. Proper methods of lifting also are explained, so he can avoid injury from that cause.

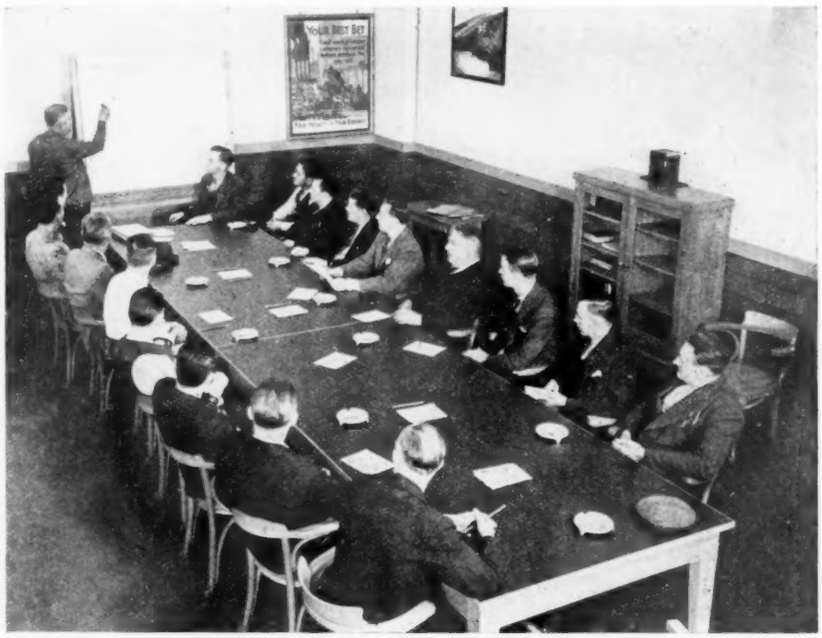
Next, the employees' activities director is visited. He hands Jones a booklet "Information for the New Caterpillar Employee," which they go over together. Information on employee activities is contained in this booklet, as well as a statement of the agreement between the company and its employees, and a list of a few important shop rules.

Last year nearly 2,500 men and women took part in the various activities, and they paid for practically the entire program themselves. The director serves only to coordinate all of these activities and to prevent interference of special events and meeting dates.

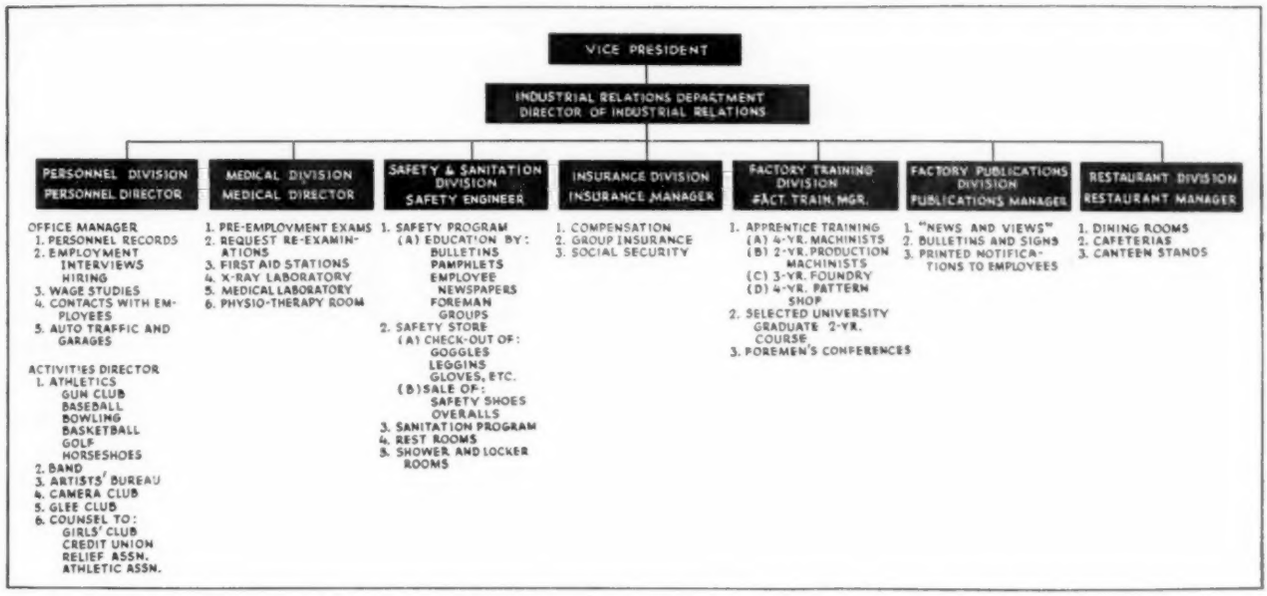
The company only lends a helping hand when requested by the workers. It furnishes such major facilities as the baseball diamonds, but profits from vending machines throughout the plant pay for all maintenance. Had the money spent by the company last year for activities been divided, it would have amounted to less than $1.00 per employee. It is estimated that more than 50,000 employees and their families witnessed the various contests over the year.

The employees, entirely of their own volition, many years ago organized a relief association which pays accident, sickness and death benefits. This past year they decided they wanted a Credit Union. We assisted by supplying offices for them in our industrial relations department. These two groups are aided by permitting payroll deductions, but in no case are deductions made unless authorized by the employee himself.

Having given the new employee a glimpse of the activities which are available to him, we give him a picture of the product which he is to make. He goes across the street to our Showroom, where he looks over the company products. The showroom management then takes him on a tour through the plant. After view of the activities of the company, Jones is introduced to his superin-



Foremen's conferences are held daily in a special room, usually under the direction of a superintendent or other factory executive. A different topic is discussed each week by all groups

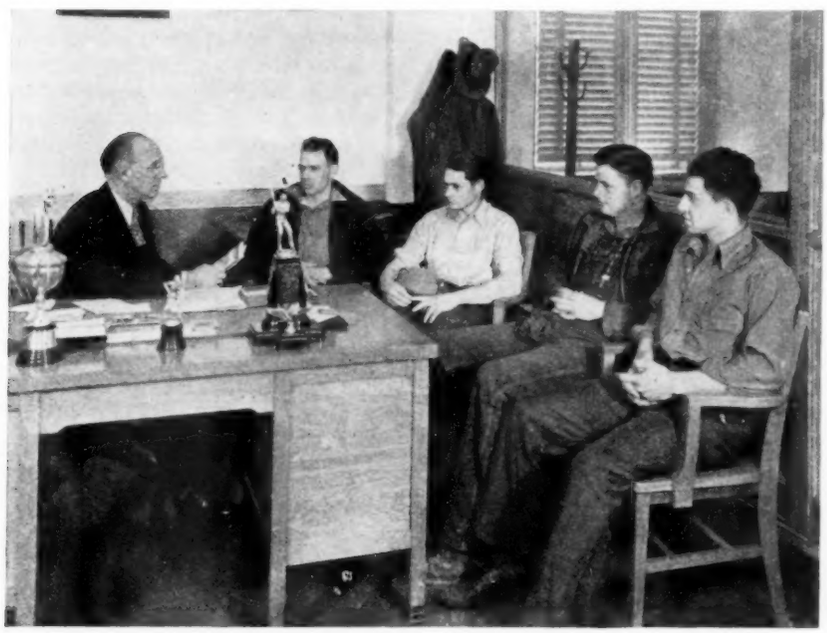


Activities of the Industrial Relations Department are coordinated carefully to insure fair and capable service to each employee from the moment he enters the personnel offices looking for a job

tendent and foreman by the activities director. This entire process may take a day to accomplish.

Nor does our interest in him end there. A system of appraisal and control is in effect which watches the man and insures that he is given every opportunity for promotion after he is on the job. According to this plan a man is rated up to 10 points on ability, 10 points on efficiency, 5 points on physical condition and 10 points on personal habits. The appraisal is made periodically by the foreman and must be approved by the superintendent and by the factory manager. In promotions, lay-offs and returns these factors as well as seniority, number of dependents, and residence in the community are considered.

A department which Jones has not contacted is the factory training division. This handles three kinds of training: apprentice, foreman education and two years' university graduate training. Mechanical, agricultural, mining, chemical, electrical and civil engineering, also a few non-engineering students, are taken from several universities upon graduation. They are put through a special two-year course in the shop and other departments before being permanently assigned to a department. The plan has been in effect for some seven or eight years now and has proven successful. An illuminating sidelight on company policy is that many in our supervisory group have grown up with the company.



Every encouragement is given groups of employees who want to provide for their own entertainment or improvement; here the activities director explains the athletic and other organizations carried on by the employees

For our foreman education course the plant has been divided into 28 groups of 15 to 24 men, each with a leader. Every week a new subject is considered and discussed. All phases of human characteristics are brought up in the discussion, not in a hit-or-miss fashion but according to a careful plan. A letter on the subject of the week is accompanied by a quiz which each man is to return with any questions or ideas on the subject.

Employees in general are offered special courses throughout the year. Last spring a diesel engine course proved popular. We recently concluded an inspection course which attracted a voluntary registration of almost 8,000 out of approximately 11,000 employees.

Many employees no longer wish to carry their lunches so we offer cafeteria service to both shop and office workers. All are served from the same kitchen. Our shop cafeteria runs the full length of our big machine shop which gives convenient tables for any men carrying their lunches. Food is sold at cost and each year the business shows a deficit.

70 Miles of Welding

Butt welding of steel channels into rectangular tubing wasn't a simple production job, until fire hose under air pressure was hit upon as the jig clamping means

G. H. KOVEN
President, L. O. Koven & Bro., Inc.

THERE is nothing particularly striking about 70 miles of welding if one is thinking about welded structural steel for buildings or bridges. But 70 miles of welding are impressive when done on a single mass-production job of equipment. And on a contract of this kind every effort will be made to develop cost-cutting welding technique as well as efficient production methods.

When specifications were issued for the new Archives Building, Washington, D. C., many thousands of square feet of shelving were involved. Vertical and horizontal supports for the shelves were required to be in tubular form, but the specifications called for rectangular, not round tubing.

Rectangular tubing in the weight and size called for was not available in the quantity and in the lengths required. It could be produced in that quantity, but the cost was sufficiently high for the contractor to determine whether there was a way of getting the tubing at a lower price than for extruded tubing on which estimates had been based. After a thorough investigation the contractor placed his problem in the hands of L. O. Koven & Bro., Inc.

Welding was the obvious solution to the question of whether or not satisfactory rectangular tubing could be produced economically in the size required, 2 x 3 in. with a thickness of about ¼ in. By using two hot-rolled steel channels, each with a special bevel at the extreme top and bottom edges, a weld down the joint, top and bottom, between these channels would produce the tubing required.

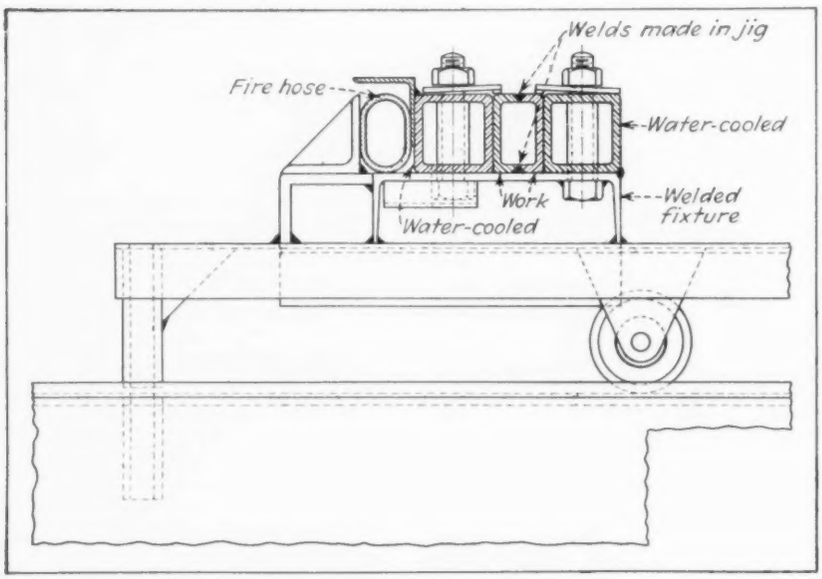
This phase of the job was easy enough. Channels in 22-ft. lengths could be obtained with the required bevel, and they could be welded to form a rectangular tube. But to produce the 35 miles of tubing called for in the contract meant 70 miles of welding on 16,800 22-ft. channels in order to make 8,400 pieces of tubing required. These were later cut up into 7- and 14-ft. lengths.

That is a lot of welding on any job, but there were complications. Obviously, the heat of the weld would tend to warp each channel. Warping would take place not once but twice. If proper methods were employed to straighten the welded pieces, once after the first joint had been made and again after the final joint had been made, how could the two channels be held in place to avoid distortion during welding and insure a clean, tight job? Again the number of pieces to be handled was a complicating factor. A satisfactory method might be worked out for a few 22-ft. lengths, but would probably prove unsound economically for 8,400 of them.

The jig finally set up appears about as shown in the accompanying drawing with the exception of certain important improvements described.

Essentially the jig consisted of two racks, each holding a pair of channels clamped in place. A motor-driven carriage was set to run on the rails above the two racks. On the carriage was mounted the welding equipment with the automatic welding head capable of being set rapidly at will, but also arranged for adjustment laterally and vertically. The carriage on which the welder sat during welding could not move laterally with respect to the two channel racks below, but its motor drive propelled it along the channels at a fixed rate of speed.

The duplex welding jig for the channels was mounted on a table which could be shifted laterally so that one-half of the jig could be placed directly under the welding head for welding the joints in one



Two set-ups of watercooled clamping racks with fire hose were mounted on the laterally movable table so that welding could proceed on one set of channels while the other set was being reversed or removed

pair of channels, while the other pair of channels was removed and two new ones put in place. When the weld on the one side of the tubing was finished, the rack base was shifted laterally, so that the second pair of channels was under the head, and the welded tubing was withdrawn for straightening and replacing with two fresh channels.

Of course, when the weld was finished on one side of the channels, the piece had to be removed from the jig and put through a roll to eliminate the warping caused by the heat of the weld. In practice, a few hundred pieces were welded on one side, and after straightening the weld on the second side was made, followed by a final straightening in the roll.

The welded tubing then needed only (1) grinding on such pieces as required it, and (2) trimming square on the end. Since the welder could adjust his bead very accurately to the joint between the channels, as well as the speed of the head along the channels, the weld was nicely adjusted and practically flush with the outer surface of the tubing. Thus, very little grinding was needed.

Difficulty Encountered

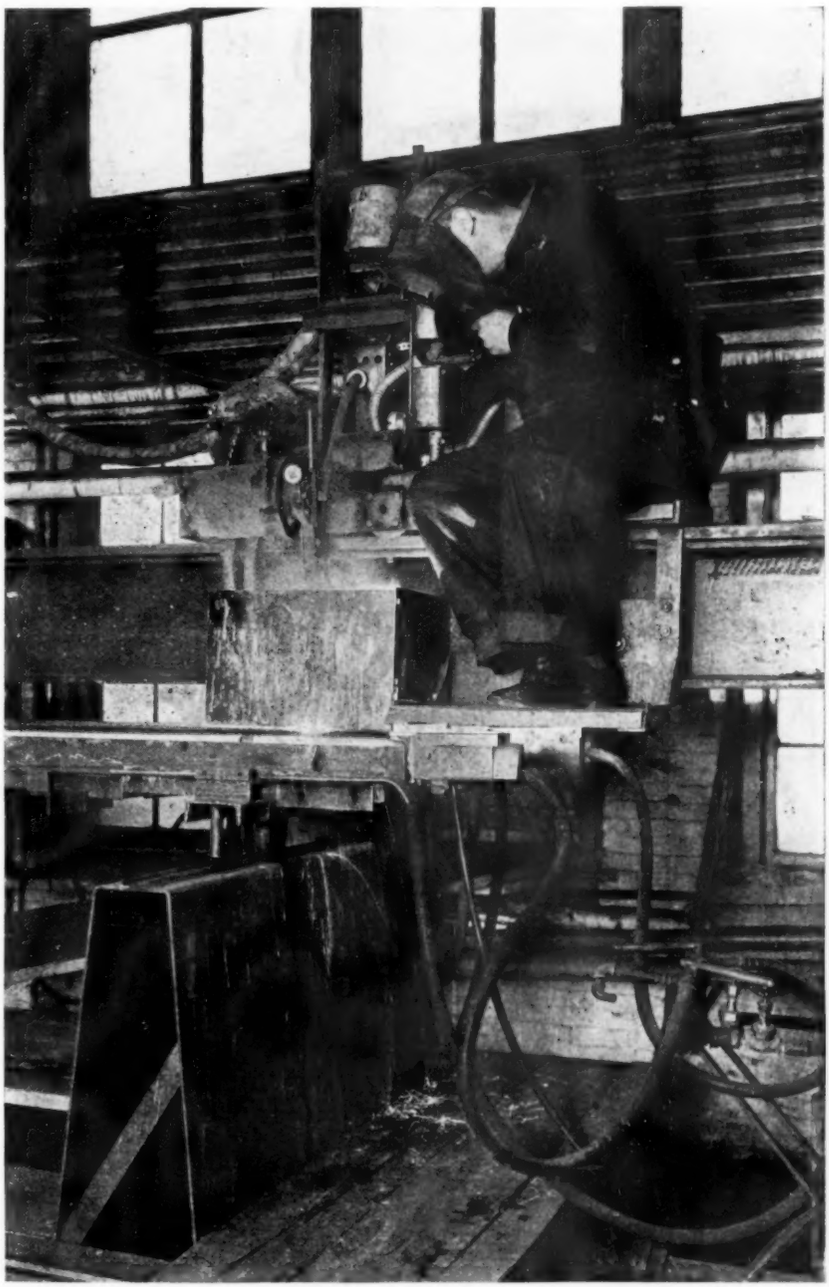
Except for one important detail, this jig would have been capable of handling the job with only three men—one to weld and two to keep the racks loaded and put the tubing through the rolls. The trouble encountered was devising a suitable method of holding the channels rigidly during welding. Obviously, the 22-ft. lengths were not absolutely straight to begin with. As soon as the heat of the weld was applied, warping began.

Any mechanical system of clamping the two channels together involved intervals between points of support, with consequent distortion between those points. A number of different methods of support were tried, but they all fell down on this one point of providing rigid, continuous support along the entire length of the channels.

Finally an ingenious but simple clamping method solved the problem and put the whole job on a successful production basis. Continuous support was provided by pneumatic means. Two square tubes were set on the rack, one fixed and the other operating in slotted guides with sufficient play to provide for ease in placing the channels and still minimize the space provided for the pneumatic tube. This tube consisted of a piece of fire hose, which was placed between the movable square tube and the fixed side of the rack. The fire hose did not take up much space, except when air was admitted for clamping the work.

When the channels were set in place on the rack bed, air pressure of 50 lb. was applied to the hose. It expanded against the movable square tube and forced the channels tightly together with uniform pressure along their entire lengths. As welding proceeded, the channels were still held rigidly in place and no distortion from point to point of support could take place. The two square clamping tubes were also water cooled to minimize the heat effects of welding on the channels. Hence, except for the one pass through the roll for each weld to overcome residual distortion, there was no variation in the space between the channels as the operation proceeded. A clean, uniformly welded joint was easily obtained.

With the pneumatic jig in use, the production of the 8,400 22-ft. lengths of rectangular tubing proceeded on a production basis and the job was finished well ahead of schedule. It was done at a price favorable to both the contractor and the Koven organization.



The operator sat on a carriage that moved on rails above the welding jig, and he could position the automatic welding head precisely to the joint between the channels, and thus obtain a smooth job

Shave Dies and Their Application

Smooth contours on office equipment parts can be produced by shaving if correct principles of tooling are applied

WALTER KASSEBOHM
Superintendent of Tool Division
Marchant Calculating Machine Company

MANUFACTURE of office machine equipment, for instance, typewriters, adding machines and calculating machines, involves the production of small stampings which must have a square edge or a smooth periphery for the purpose of establishing a good working surface resulting in a minimum of friction.

Stampings of a gear, a cam or a trip lever, as shown in Fig. 1, would not give smooth or accurate action on surfaces, where forces are transmitted, without being shaved.

Shaving is a "squaring up" operation of the sheared edges of a blank and is, of course, applied to outside edges of parts as well as to the edges of holes used for bearing purposes.

Fig. 2 illustrates the stamping of a blank in a die. After a certain amount of plastic deformation, which depends on the material used, a shear and break take place, and the blank has an edge as shown. The bottom surface has a rounded edge *A*. Bordering on the rounded edge is the smooth and shiny surface *B*, which is the actually sheared surface. Adjacent is the tapered rough break *C*. The top surface of the blank has a small burr *D*, the amount of which depends largely upon the clearance between punch and die block and the ductility of the material which is being punched or blanked.

Fig. 3 shows a "shaving" operation which consists of the removal of the rough (sheared and broken) edge of the blank. According to the thickness and ductility of material involved, a good smooth working surface can be produced with a single, double or even multiple shaving operation.

When applying several shaving operations, the first step should remove the largest amount, and the consecutive steps should remove less and less of the material to be shaved.

Since a "shave" is a material cutting operation, similar to cutting as done on a milling machine, lathe, planer or shaper, the cutting edge of a shave punch is most effective when

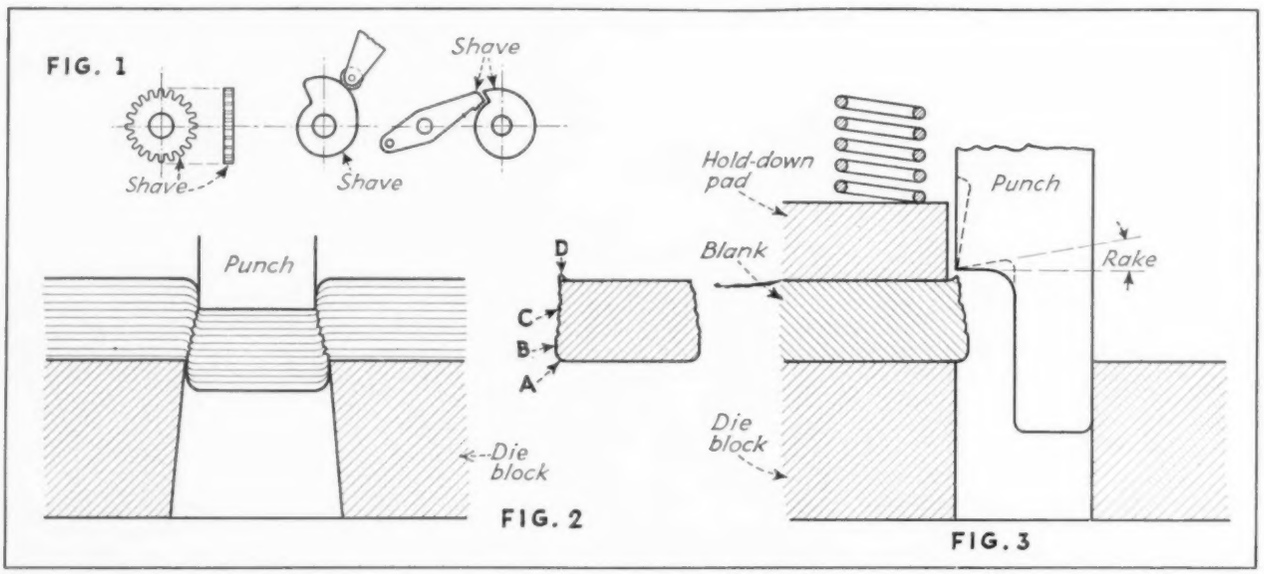


Fig. 1—These parts are typical of the class of work for which shaving operations are particularly applicable.
Fig. 2—The action of a punch in a blanking operation accounts for the rough edge left on the metal.
Fig. 3—While a rake angle would usually improve the action of a shaving punch it is not often used

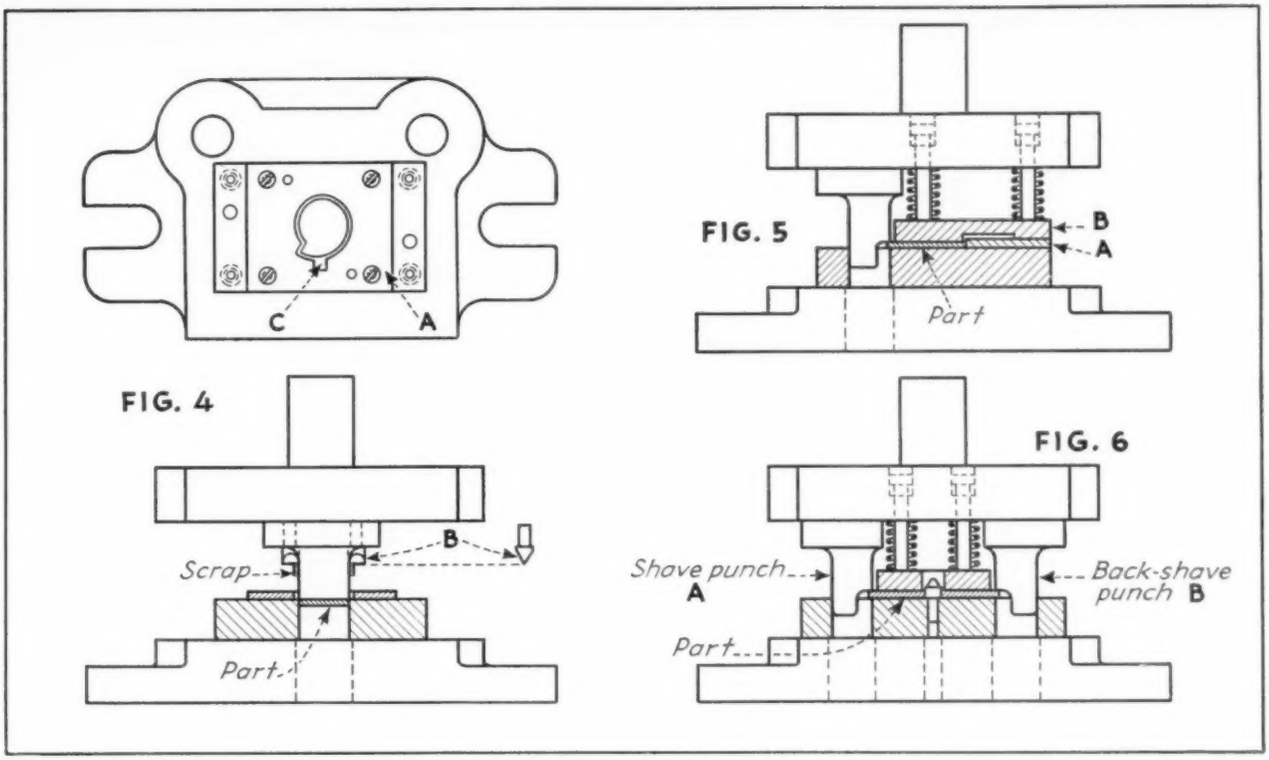


Fig. 4—Scrap cutters are used to good effect on this push-through shave die. Fig. 5—A heel on the punch prevents spring when the trim type of die is used. Fig. 6—In another variety of trim die the part is prevented from slipping by a back shave punch

ground with standard rake angles as on cutting bits used on such machine tools. The dotted outline on the punch, as illustrated in Fig. 3, shows the ideal cutting edge of a shaving punch; but the grinding of rake angles on a shaving punch is, in most instances, costly and impractical. Shaving dies, therefore, have with few exceptions punches with square cutting edges which are easy to grind and to maintain.

Four distinct classifications of shaving dies can be made:

1. The push-through die.
2. The trim die.
3. The compound die.
4. The progressive die.

Fig. 4 shows a shave die of the push-through type. The die is similar in construction to a blank die with the exception that the clearance between punch and die block is very small and practically amounts to an easy slip fit in the die block which has no angular clearance.

This type of die is used when the entire circumference of the part has to be shaved. The part is placed in a nest *A* for accurate location. Since the scrap, consisting of a thin ring which is left after the part is pushed through the die block, sticks to the punch, scrap cutters *B* are provided for cutting and easier removal of scrap which is in most cases blown away by air. The nest *A* has a groove *C* to promote the easier removal of the scrap ring in case it should stick in the nest.

A shave die of the trim type is illustrated in Fig. 5. The die itself is similar in construction to a plain trim die, and the part is located in a nest *A* and held down by a stripper *B*. When locating parts in this manner for a shave operation, it should be made sure that the locating edge of the nest is always of sufficient height opposite the surface to be shaved. The height of the nest should amount, at least, to the thickness dimension of the part so as to give sufficient locating edge and a satisfactory backing up of the part during the shaving operation. The punch for this type of shave die has a heel which serves the purpose of backing up and supporting the punch during the period of working. Since this heel is to prevent the punch from springing out of alignment, it has to have a close slip fit in the die block, especially the surface just opposite the actual working area of the punch.

The shaving scrap is pushed through the die block, and the part has to be removed by a mechanical knockout or by an air blast, since it will remain in the nest on the upstroke of the press due to the spring-operated stripper.

Another trim type shave die is shown in Fig. 6. Instead of nesting the part opposite the actual shaving in a substantial nest a back-shave punch is provided. Such a back-shave punch *B* will prevent any slippage of the part, and the actual shaving punch *A* will, therefore, produce a good square corner. Slipping of the part through faulty nesting will inevitably produce a tapered shave edge.

Nests, which hold the part at certain sections of its contour, are locating it on the die block in the correct position for the shaving operation. Pilot pins, as shown in Fig. 6, can, of course, also be used for location.

Shave dies of the above mentioned type have been successfully used on parts which needed a shaving operation at a number of different sections of the contour, as well as sections in different planes of the parts.

Fig. 7 shows a shave die of the compound type. The blank is loaded over pilot *A* and is pushed into the die block, which is made to the size of the wanted part and has no angular clearance. It is removed from the die block by a shedder *B* and a positive knockout arrangement. The shedder has an oil-seal breaker to prevent oily parts from adhering to it. Shave scrap will remain on the punch which is provided with scrap cutters *C* for shearing it into units which can be easily removed. This type of

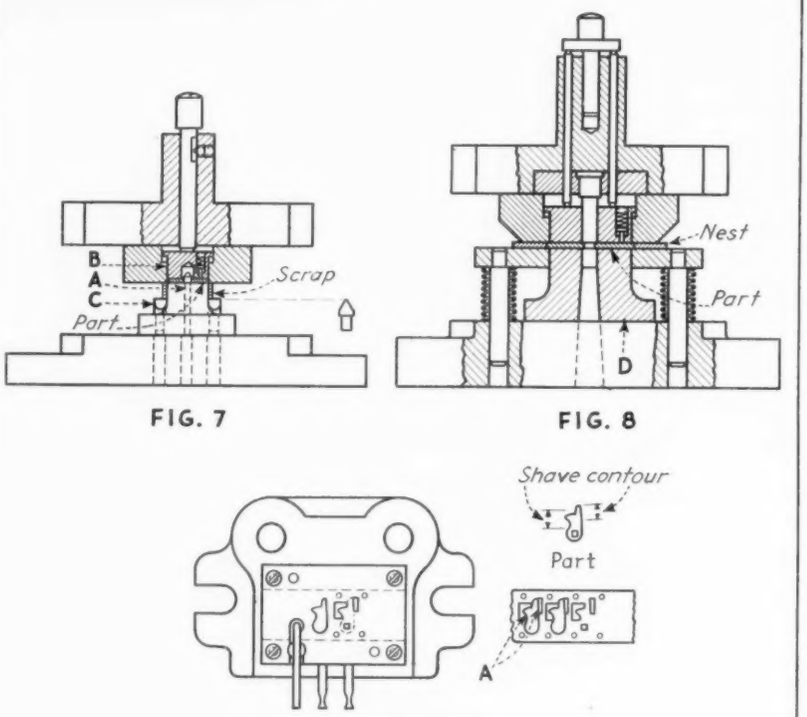


FIG. 7

FIG. 8

FIG. 9

Fig. 7—This compound shave die is suitable for parts that can be located from a hole. Fig. 8—Another compound shave die is designed to shave a hole in the blank as well as the outside contour. Fig. 9—Where production warrants, a progressive die can be used to combine shaving with the blanking of the part

shave die is commonly used when the total circumference of a part has to be shaved and when the part has holes which can be used for locating purposes.

Another construction of a compound shave die is shown in Fig. 8. This die not only shaves the outside contour of a part but also any contoured hole in the blank. The part is located in a nest which is dowelled to a guided stripper. Fig. 8 is self-explanatory as far as the construction of the die is concerned, but it is imperative that the punches of the shave die are made with good slip fits in their respective die openings in order to produce perfect shaved surfaces without breaks or burrs.

The scrap of the shaved outside contour remains in the nest and has to be removed either by mechanical means, a pick or by a blast of air. Scrap rings of the shaved hole are pushed through the punch *D*. Positive knockout and shedder are again provided to remove the shaved blank from the die block.

Fig. 9 shows a shave die of the progressive type. Such a die is not a single purpose shaving die but combines the shaving operation with the actual blanking of the part.

A die of this type is of great advantage if the contour of the part is only to be shaved at certain sections and if a large production of parts justifies the more expensive construction.

In one of the progressive steps of the die, as shown in Fig. 9, a contoured hole is pierced in the strip stock in such a way that it leaves the correct amount of material for shaving adjacent to the blank contour where a smooth finished edge is required. The blanking punch, in one of the next steps, does, therefore, the actual shaving operation at the section of the contour where shaving stock is provided through the preceding piercing operation. A narrow fin of material will remain attached in the strip stock, as shown on *A* in Fig. 9.

The amount of stock to be removed through a shaving operation is important as a shaving allowance which is too large would produce a part with an edge which has the same rough appearance as the original blank. Too small an allowance for shaving will, on the other hand, not clean up the blank edge, and it is imperative that the correct stock allowance for shaving be provided. This shaving allowance depends to a large degree on the thickness of the stock which is to be shaved and to a minor degree on the hardness or ductility of the stock.

Fundamentally, it can be said that soft steels need a smaller shaving allowance than hard steels. Thicker steels need to have a larger allowance for shaving than thinner stock.

A good rule for finding the correct amount of shaving allowance for a single shaving operation is:

Eight to ten per cent of the stock thickness for No. 1 temper or "hard" stock (approximately 90-100 Rockwell B).

Six to seven per cent of the stock thickness for No. 3 temper or "quarter hard" stock (approximately 65-75 Rockwell B).

These allowances are the amounts which are to be added to the edge of the blank and should, therefore, be doubled if measured on a diameter.

Correct amounts for shaving allowance for a double shaving operation are:

No. 1 temper or "hard" stock (approximately 90-100 Rockwell B).

First shave: seven to eight per cent of the thickness of the stock.

Second shave: three to four per cent of the thickness of the stock.

No. 3 temper of "quarter hard" stock (approximately 65-75 Rockwell B):

First shave: five to six per cent of the thickness of the stock.

Second shave: two to three per cent of the thickness of the stock.

Surfaces by Abrasion

FRANCIS W. SHAW
Whitworth, Lancashire, England

In the editorial note "Court of Last Resort" (*AM*—Vol. 82, page 283) appears a sort of doubt as to the legitimacy of the process of flat lapping. Recent elaborate experiments have disclosed the fact that, unless the abrasive particles are actually rolled or hammered into the surfaces, not a particle of abrasive remains in them after proper completion of the process, which means: continue the lapping, gradually reduce the feed of abrasive, and finish without abrasive but with an ample supply of oil and under a light load. The microscope shows no sign of abrasive even when lapping is arrested while abrasive still remains on the surfaces if these are wiped clean. In any case, most of the particles are so small they could do no harm.

DAD SAYS

It Ain't So Hard To Figure Out What a Good Foreman Should Have

BEING a maintenance man I get around all the plants and lately I've been talking with the men about their foremans. I have noticed that some seem to like their bosses while I know others don't think enough of 'em to speak to 'em on the street, so I've been tryin' to figure out just why this is so.

Now take Shorty in charge of the rough end over in Plant D. The gang all seem to like him. He ain't easy on his men either. They all call him Shorty but the way they say it, it almost sounds like they were saying, "Mr. Shorty." He goes around all dressed up and always has clean hands but let anything go wrong he can get in and show up any man on any of the jobs. He's a friendly sort of a fellow yet no one gets very familiar with him. You ask any man about him and he'll tell you he's hard but knows his stuff and is a square shooter.

Then there's Big Mike up on the finished end in the same plant. Now there's a funny thing. He's a big, good natured fellow that kids with his men. I guess they like him but somehow they don't seem to think much of him. If he tells them to do something just like as not they kid him into believing that they can't do it. Of course he's too fat to carry an operation so he never tries—maybe that's why he don't seem to go over very big with his men.

Public Enemy No. 1—as far as the men are concerned—is Scotty out on the loading dock. Of course that's not hard to figure out because he's just a double-crossing —— ——. Nice enough and certainly has the brass hats thinking he's something; but the men know that he's so crooked he couldn't sleep on a corkscrew. Of course the thing that makes the men so sore is that they know how he gets away with it and they know that he's double-crossing the bosses just like as how he's double-crossing them.

Another completely hated bird is the old dyspeptic—Mr. Washington—in charge of the Plating Department. I'll bet that fellow would divorce himself if he could. He knows his job, I guess, and so far as I hear is on the up and up, but he hasn't smiled or spoken a pleasant word in years. There's a saying around the plant, "A super's headache is a pain in the neck to the other fellows."

You know, when you kinda think it over, it ain't so hard to figure out what a good foreman should have.

He should be the boss.

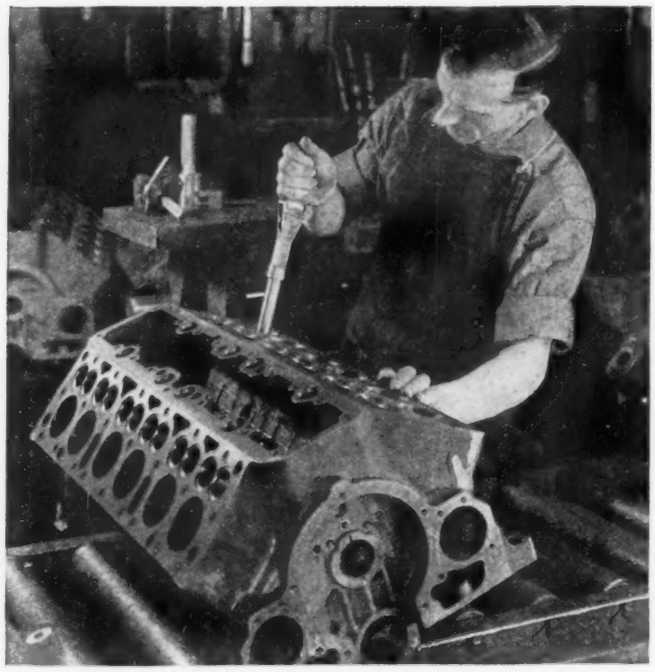
He should be a square shooter.

He should know his stuff.

He should be mentally honest.

He should be human and pleasant.

I wish the "big bosses" could get a worm's-eye view of these foremans some time. I'll bet it would look a lot different from the bird's-eye view they see all the time.



Every cylinder bore is measured with a Johansson indicating gage, and a piston is selected to give just the desired clearance in the cylinder

Overweight pistons are gripped by the jaws and a tool comes up from underneath to remove metal from inside the piston skirt

Limits Kept Close on the Lincoln-Zephyrs

Special gages and machines maintain close tolerances on piston fits, piston weight, ring pressure and timing of camshaft lobes

FRED H. COLVIN
Editor Emeritus, American Machinist

MODERN AUTOMOBILE building has done much to make possible the extreme accuracy in machining that is now found in many kinds of machine work. Yet with tolerances much smaller than was thought possible a decade ago, there are still a number of places where selective assembly, rather than absolute interchangeability is considered advisable.

Taking the Lincoln-Zephyr as an example of high-grade workmanship, there are, for instance, about 4,000 inspections where "Jo" blocks are used in setting or checking the gages used. The tolerances average from +0.001 to +0.002 in., but there are about 200 inspections where the tolerances run down to + 0.0002 in. Even for some of these more accurate parts, selective assembly is used to secure the exact clearance desired between the mating parts. Piston fits in cylinders and piston-pin fits in pistons are good examples of selective fits.

In spite of the greatest care in "diamond" or single-point boring of the cylinders, every bore is measured, and a piston is selected to give just the desired clearance in each cylinder. The gage is of the Johansson type, indicating in tenths of thousandths.

The piston for each cylinder is selected from a group that has been previously sorted by weight. A variation of two grams, plus or minus, is the only tolerance permitted in any one set of twelve pistons. In English weight this is a maximum variation of about a seventh of an ounce. Average variations are much less.

Piston clearance is determined by the steel tape method which, while well known, is considered most effective in this plant. The steel tape is $\frac{1}{2}$ in. wide and 0.002 in. thick and is clamped in a special holder that is part of a scale. The pull necessary to withdraw the tape from between the piston and the dry cylinder should be 5 to 8 lb. for the clearance desired. According to some authorities, this amount

Spring or wall pressure of each piston ring is tested by closing the ring to a master setting disk and noting the scale reading. This test checks the total pressure of the ring against the cylinder wall

Uniformity of piston-ring wall pressure is tested by placing it within seventeen pins inserted in a master ring. If any pin falls out the clearance at that point is tested with oversize pins

of pull would indicate a clearance 50 per cent greater than the thickness of the tape, or 0.003 in. between piston and dry cylinder wall. Pistons are ground slightly eccentric, being 0.00125 to 0.00150 in. large at right angles to the pin.

Uniformity of piston weight is secured automatically by an ingenious machine made by the Morris Machine Tool Company. The weighing scale is so mounted that one end of the balance beam supports the piston as it is placed between the jaws. If the piston is of correct weight the scale will read zero. A piston that is too heavy will depress the beam arm and show the amount of overweight on the scale.

When the heavy piston comes to rest the jaws are clamped on the piston and the scale support is withdrawn. A vertical spindle carrying a cutter comes up from beneath the piston and removes the right amount of metal from the inside of the piston skirt to bring it to the proper weight. The heavier the piston the lower it settles in the vise jaws and the more metal is removed by the cutter. The machine is rapid in operation and secures uniform weight well within the specified tolerance.

Connecting rods are weighed in the usual manner. By removing surplus stock left for this purpose the desired weight is secured. Each end is weighed separately. The small end is held to plus or minus two grams and the large end of the rod to plus or minus one gram.

Piston rings are tested in a number of ways, to insure not only size but also spring pressure or tension, gap and concentricity. Thickness is checked by go and not go gages in the usual manner. Tension, or wall pressure, is checked on an International direct-reading scale. The ring being tested rests on small rollers in both the upper and lower rests, to eliminate friction. Behind the ring being tested is a dial indicator. The two halves of the clamps are brought together to a master setting disk, the size of the cylinder bore, this being registered on the dial indicator shown.

The pressure required to close the ring is read directly on the scale, which is operated by the lower rest. Pressure tolerances are 9 to 12 lb. for the oil-regulating ring and 8 to 11 lb. for the compression rings.

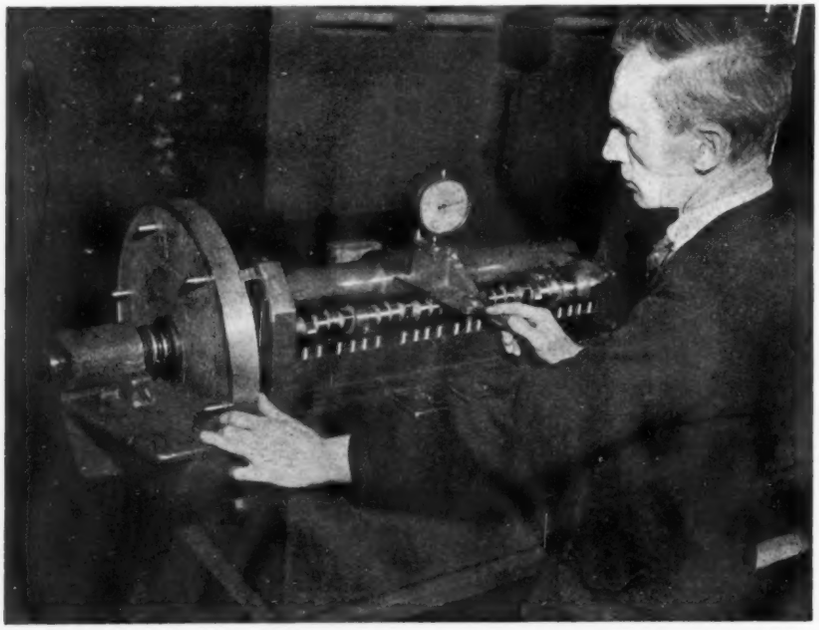
In addition to the total pressure of the rings against the walls, the uniformity of the pressure is also carefully checked by a special gage and method, known as a pin gage. A master ring is hardened, ground and lapped to a size that will permit the insertion of seventeen master pins at intervals around the circumference. These pins are 0.1875 in. diameter and have a knurled shank 0.125 in. diameter, which project through clearance holes in the back wall of the ring.

These seventeen pins are put in place and the ring to be tested is inserted inside the pins. If the ring has equal pressure at all points the pressure on each pin will hold them all in place when the master ring is turned upside down. If one or more of the standard 0.1875 in. pins fall out, the size of the oversize clearance is measured by using the graduated pins shown in the case. These extra pins vary by 0.0001 in. and are all marked

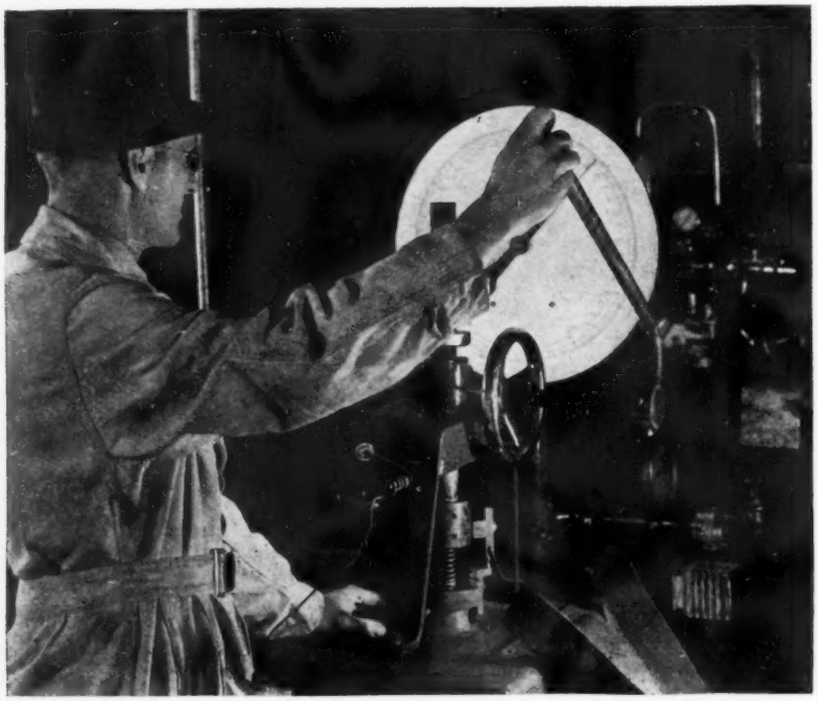
with their size. By trying one pin after another until the ring holds a pin in place, the amount of oversize clearance can be checked accurately.

Width of the gap in the ring can vary from 0.008 to 0.015 in. This is checked with feelers while the rings are held in a specially constructed barrel that represents the actual cylinder, and holds 30 rings at each loading. The gaps are all lined up by a special device before loading into the barrel. An electric light inside the barrel helps in checking the gap. Rings are tested individually for roundness by placing in a master ring having a light that shows any lack of contact with the master ring.

If any piston ring falls to the floor it is thrown out as a reject. There is always the possibility of distortion or the starting of a minute crack, and no chances of this kind are permitted.



All 24 cam lobes on the camshaft are inspected both on the opening and closing sides, the large graduated wheel being marked with tolerances for angular timing of each cam



Valve spring pressure must be right for varying amounts of compression

The Zephyr camshaft has 24 lobes, or separate cams, the whole shaft being cast in one piece. The important function of a camshaft is to have the angular timing relation of the cams as nearly perfect as possible. This angular relation is tested in a special fixture. The cams are tested at the heel or beginning of the rise. As shown, the twelfth cam from the left is being checked.

With the camshaft in place the arm carrying the dial gage is brought down over the cam to be tested, until it rests on the hardened plug in front. The dial indicator is read on both the opening and closing sides of the cam. The position is then read on the edge of the 16-in. wheel at the left. This wheel is graduated for the opening and closing side of each lobe. A tolerance of $\frac{3}{64}$ in., plus or minus, on the graduations of the wheel is equivalent to approximately 0.0005 in. on the cam itself. Every cam on every camshaft is tested before assembly.

Valve springs are also tested for compression. Each spring is compressed by a plunger, operated by a hand lever. As the lower end of the spring rests on a scale platform, the pressure required is shown by the hand on the large dial. Graduations on the rim of the wheel on the hand lever shaft show the amount of compression, while the scale weighs the pressure at any point. After testing the spring goes into the chute at the right and joins the others that have passed the test.

Aluminum cylinder heads are cast in permanent molds. They are tested both for leakage, by water pressure, and for the depth and volume of the combustion chamber. The heads are clamped on a flat plate in a fixture, with the water passages over suitable ports. They are quickly and firmly held by equalizing clamps, after which water pressure is applied.

Four gage spots, $\frac{1}{2}$ in. in diameter are cast in fixed relation to the depth of the combustion chambers, and are used for locating in the first machining operations. This insures a close approximation to uniformity. The depth is then checked with an indicator mounted on steel bar which has a handle that is easy to grasp.

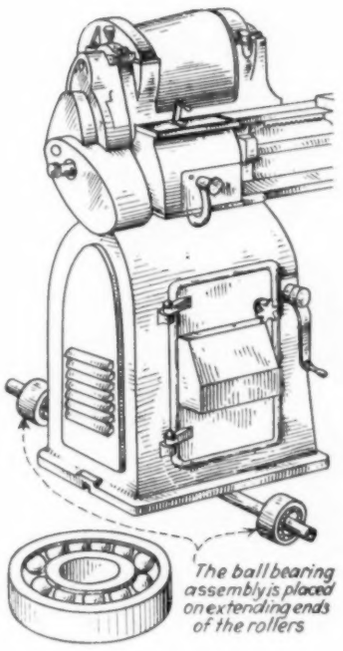
Combustion chambers are checked by volume with a gage. The gages are graduated in cubic centimeters but the total tolerance is less than a quarter of a cubic inch.

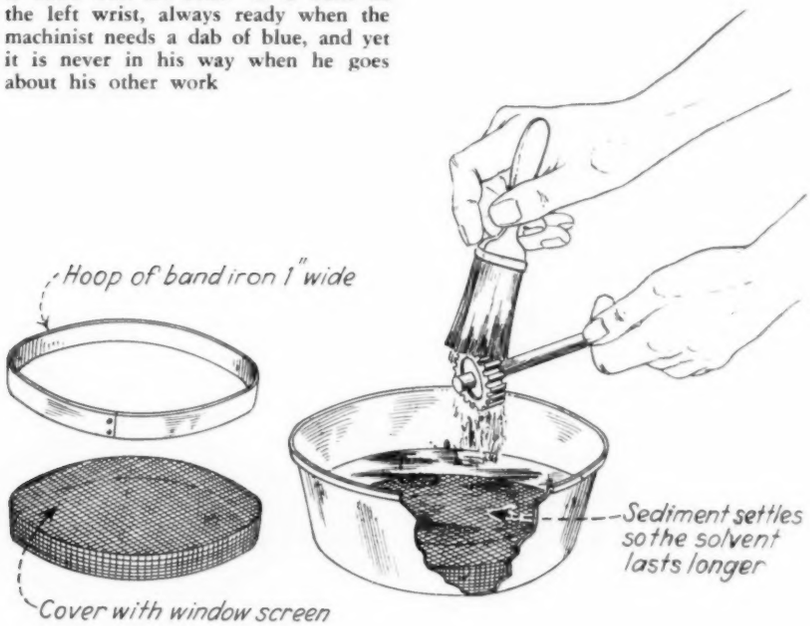
SHORT CUTS FOR THE SMALL SHOP

A. H. WAYCHOFF

A handy way of carrying Prussian blue for the machinist who has frequent occasion to use it, is to go to any 5-and-10 cent store and get a 10-cent toy wrist watch. The face should be partially cut out to make a hole large enough for the forefinger. Then the watch case is filled with the blue. It is worn on the left wrist, always ready when the machinist needs a dab of blue, and yet it is never in his way when he goes about his other work

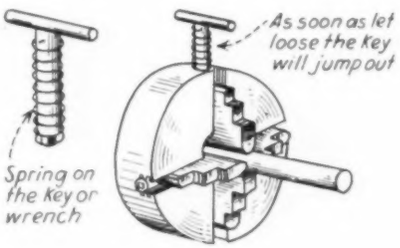
(Right) Heavy machinery is usually moved around the small shop by skidding it along on scrap pieces of pipe. The process can be made much easier by the use of old ball or roller bearing assemblies that usually may be picked up around any shop. A couple of these with an inside diameter large enough to slip over the pieces of pipe are used as in the accompanying sketch. When a machine or other heavy object is pried up to place the rollers under it, it is just as easy to go a little higher and slip one of the bearing assemblies on each end of the pipe. When the machine is let down on the roller it may be pushed along without the trouble of changing pieces of pipe every two feet or prying, pinching and lifting. Bearing assemblies were found to be very rugged and capable of supporting heavy loads





All small shops have a pan of solvent about the place for removing grease and dirt from small parts. The sketch shows a good way to reduce the expense of solvent and to get more cleaning from the same amount. A band of light strap iron, about an inch wide, is made to have a snug fit in the bottom of the washing pan. Then a piece of common window screen is made to fit over the top and around the sides of the band with the edges fastened under the bottom so the top screen will be smooth and tight. Then it is pressed tightly in the bottom of the pan and the solvent poured in. The usual method of rinsing or brushing the parts is used. However, as the foreign matter is washed off the parts, chips, sand and grease settle to the bottom through the screen, leaving the solvent above clean. When a brush is used it cannot get into the sediment and stir it up so as to make the whole solution dirty. This arrangement makes a gallon of gasoline or other solvent do at least three times the cleaning it would do if the screen were not included.

Machinists in a hurry sometimes absentmindedly leave the key in the lathe chuck and then throw the lathe in gear. When this is done the operator is lucky if something doesn't break. This accident can be avoided by drilling a small hole in the key near the handle. Then the end of a light open coil spring is run through the hole with the spring of such a length that the other end comes about flush with the square shank of the key. The spring selected should not be strong enough to interfere with pushing the shank into the chuck socket easily, but on letting loose after tightening or loosening the screw of the chuck, the spring will cause the key to slip out of the socket, doing away with the danger of forgetting it when the lathe is started



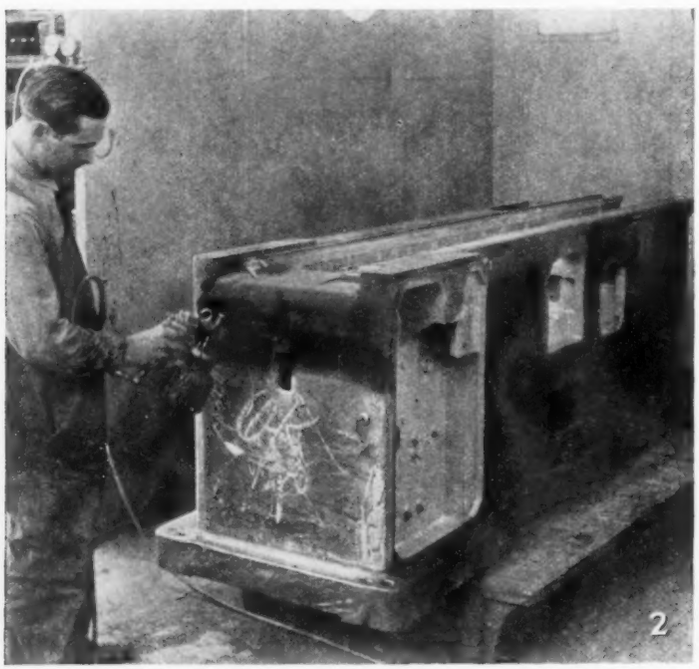
Good Packaging

Photos by courtesy of
HEALD MACHINE COMPANY

1. Castings are received from the Barre foundry, weighed, and then come to the snagging room

2. Following machining castings go to the paint room where they are cleaned with gasoline and oil and chips are removed. In spray booths, as shown, they are given a priming coat

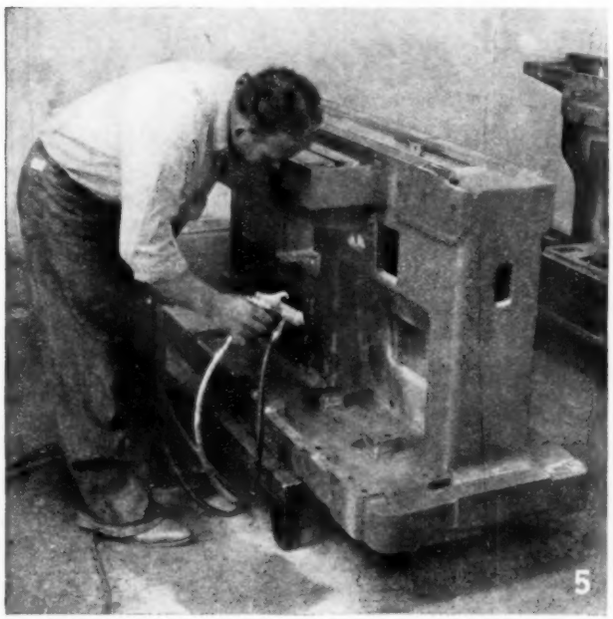
3. After priming the castings are glazed with a coat of filler. Spreaders are used for large surfaces, putty knives for smaller ones

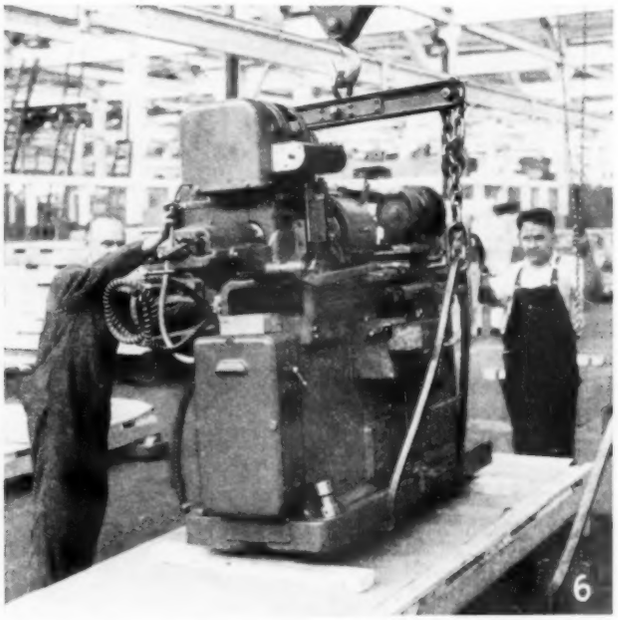


for Machine Tools

4. Large surfaces are sanded by portable tools, small ones by hand

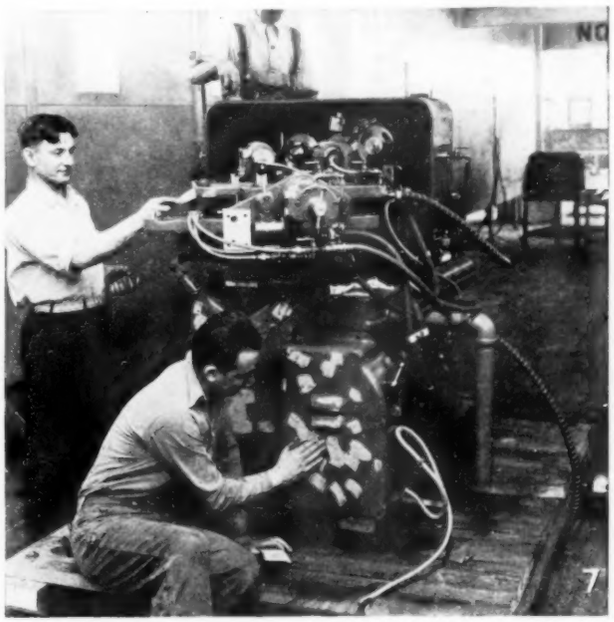
5. Yellow crank case sealer is sprayed on inside surfaces to protect them and make it easier to install interior piping. A wet color spray on the outside gives the casting an even finish

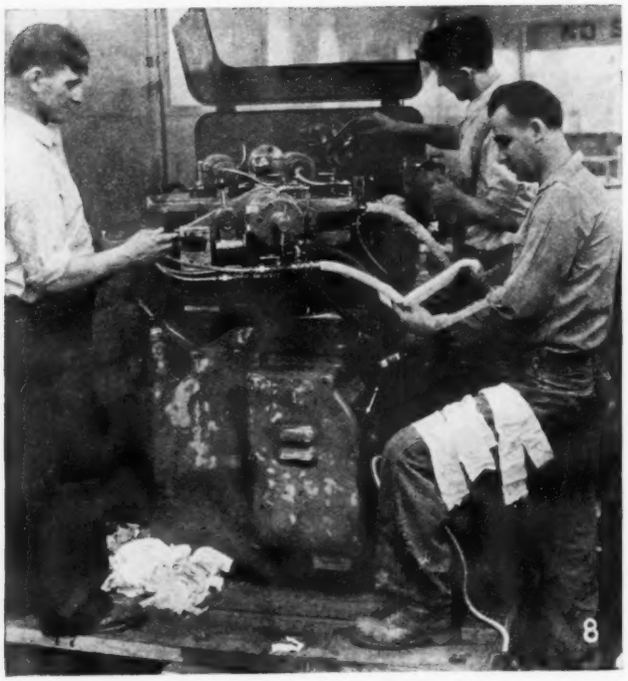




6. After assembly and test, machines are dropped by crane upon the crate skid on which they will be shipped

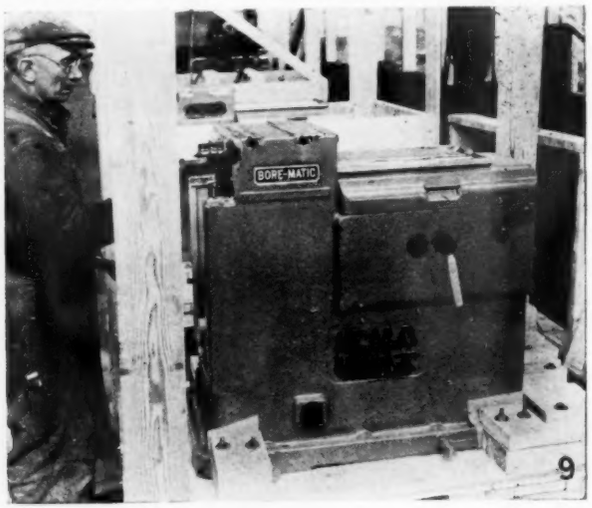
7. After thorough cleaning with Savasol No. 5 the finished machine is wiped, dried by air and then gone over and refilled wherever the surface is injured. Then follows rubbing down and another careful cleaning



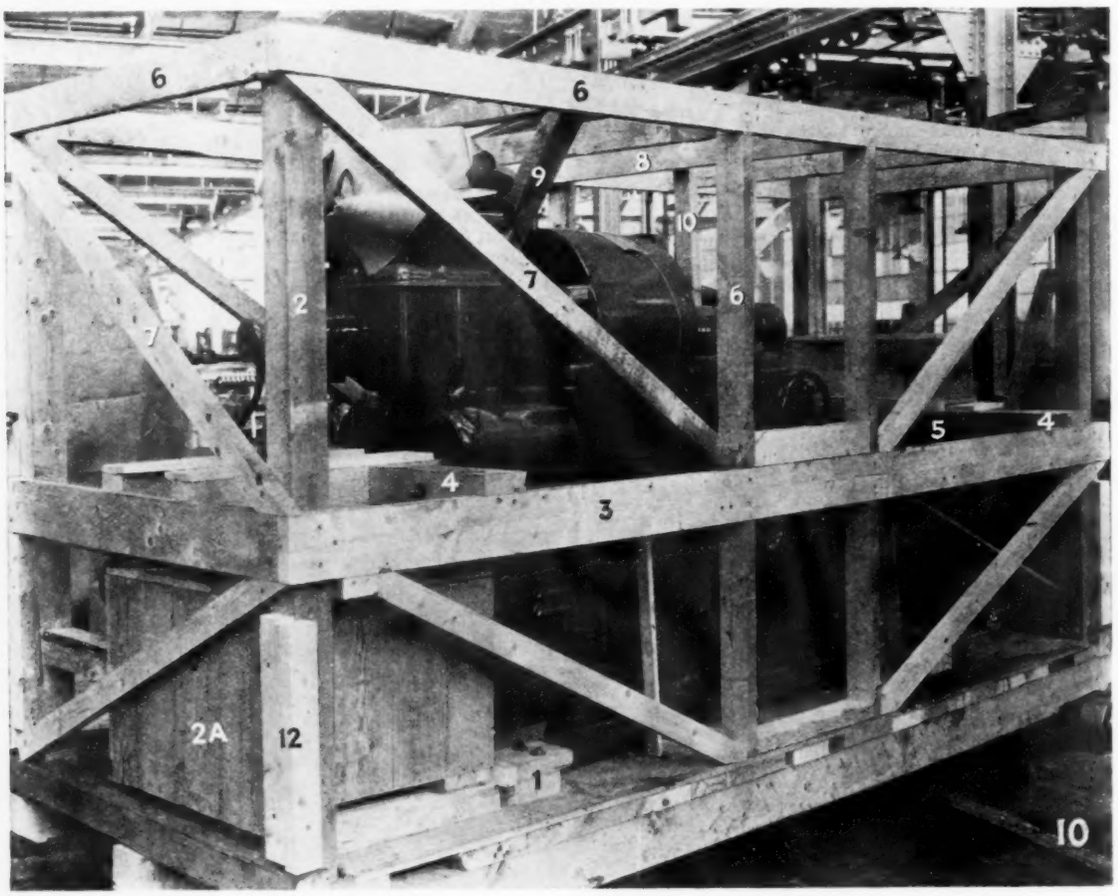


8. Before final spray finishing polished surfaces are slushed and other unpainted parts are covered with cloth. After final spraying the slush and wrappings are removed

9. Polished surfaces are slushed, and larger flat surfaces are further protected by tin foil pressed down on the grease



10. Crate is built as indicated by the numbers: (1) hard wood block through bolted over base; (2) 4 x 4 corner posts raised; (2*a*) separate boxed parts are put in and fastened; (3) 2 x 6 side pieces are put on and 4 x 6 hard wood blocks, held together by tie rods are nailed on to prevent shunting; (5) additional blocks over table are fastened by tie rods to skids; (6) 2 x 4 outer framework is attached; (7) diagonal braces go on; (8) 2 x 4 cross bars on top are set in; (9) 2 x 4 motor braces are inserted; (10) additional brace to table top; (12) corner blocks are nailed on to protect corners of crate when sling is attached to pull box out of freight car. For foreign shipment waterproof paper is fastened around the crate and is further protected by sheathing which is reinforced by band iron



Springs for airplane carburetors must pass a rigid test for deflection under pressure

Carbides for Coil Winding

Modern tools make it possible for wire and spring manufacturers to meet the demands of users for extreme accuracy

GEORGE H. SNYDER

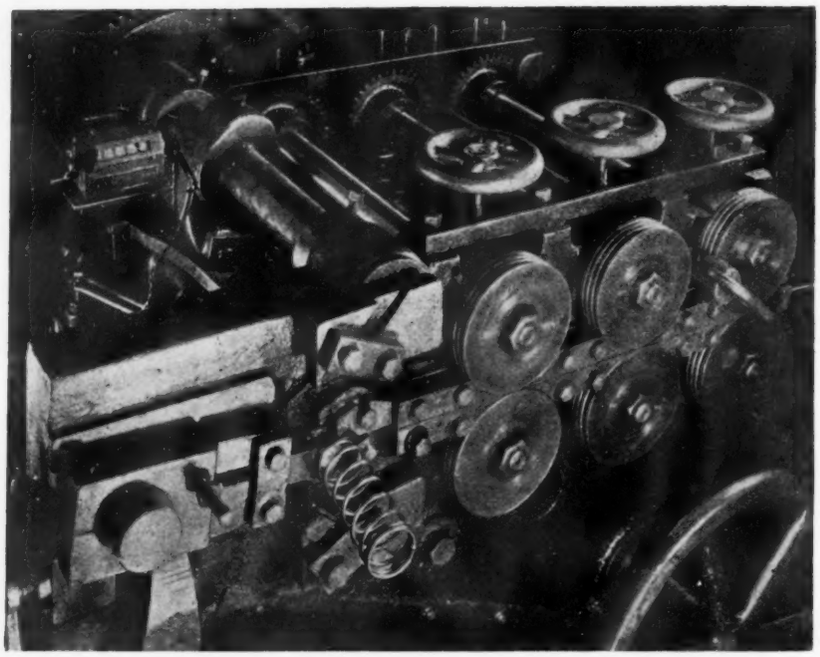
THE RECENT history of the coil spring manufacturing industry has been one of constant struggle to meet the increasingly rigid requirements of users. Springs used for such purposes as automatic control equipment and for aircraft carburetors are typical of instances where rigid tests are applied and accuracy must be found in the finished product.

The spring manufacturer has been faced with the problem of meeting these closer tolerances usually without any corresponding advance in price and, in many cases, at a lower price. The problem has been solved by the use of a new tool material, not only in spring-making machinery, but also in the drawing of the wire itself. Sintered carbides have provided tools which will turn out production work without frequent checking for accuracy.

As an example take the situation as it existed five or ten years ago. At that time, the commonly used wire-drawing dies made the production of wire to close tolerances extremely difficult. In the drawing of a 300-lb. bundle of wire, a variation of from 0.003 to 0.005 in. might be encountered between the start and the finish of the drawing, because of wear on the dies. The production of wire to close tolerances usually involved the drawing of wire in smaller bundles so that accurate diameter could be assured.

With the use of sintered carbide dies under the present practice, spring wire can be drawn continuously in lots of as much as 30,000 lbs. to a die with a tolerance of plus or minus 0.001 in. Under such conditions, the dies are water-cooled, the die blocks are air cooled, and a speed of 400 to 450 ft. per min. is possible as against a previous speed of 250 to 275 ft. per minute.

Accuracy in the size of the wire is a first requisite in the production of springs to close tolerance, since any material variation in diameter



A Firthaloy tipped bumper is used in the production of heavy coil springs

will result, not only in variation of the size of springs, but also in their characteristics.

In addition to improvement in dies, closer control of other factors was necessary in order to secure wire free from pipe, with uniform composition and quality and with the desired physical characteristics. Better finish also was necessary to insure feed without slippage or excessive die wear.

In the commonly - established method for the production of coiled springs by automatic machinery, the wire is fed through guides by rolls and is pushed against a coiling point or bumper, which forces the wire to coil around the end of an arbor. A tool, pressing against the wire between the coils, controls the pitch. The completed spring is cut off by a cutting tool, working in conjunction with a cutting edge on the arbor.

The wearing action of the wire against the bumper suggested the first application of sintered carbide tips to coil-spring production. Wear on the bumper is immediately reflected in an increase in the diameter of the spring, which, of course, results in an inaccurate product. Using the common types of bumpers, it frequently was found necessary to regrind the tools two or three times a day. The substitution of a tool with a carbide tip made it possible to reduce the frequency of grinding to periods of a week or longer. This also made it less necessary to make frequent checks on the size of the springs and resulted in the production of a smaller percentage of rejected products.

Sintered carbide tipped bumpers were found to be particularly advantageous in the production of springs made of oil-tempered wire, which carries a large amount of scale and which has a lapping or grinding effect on the bumper. The Illinois Coil Spring Company, of Chicago, which was one of the early users of sintered carbides for this purpose, has found in this type of production that high-speed steel bumpers usually require regrinding three times a day, while Firthaloy sintered carbide bumpers usually run for more than a week.

As an example of the production made possible with this tool material, this company has found, in making automobile clutch springs of No. 8 oil-tempered wire, that it has been able to produce 100,000 pieces without regrinding, which is an output of about 14,000 a day. On other similar springs, it was able to run 50,000 without regrinding, which was a three-day production, whereas the previously used tools required grinding twice a day.

Following the use of sintered carbides for bumpers, tools of this type were later applied to the guides, which are grooved wearing surfaces which assure the proper feeding of the wire to the bumper. Later, pitch tools with carbide tips also were found to be advantageous in many types of production.

Because of the hardness of sintered carbides, spring makers did not at first consider them for the arbor, since it was thought that the brittleness of the material would not make it adaptable to an operation in which the tool must undergo repeated shocks as the cutting tool strikes the material to cut off the finished springs from the wire stock.

Experiments conducted by the engineers of the Firth-Sterling Steel Company with the cutting of smaller wires showed that sintered carbides could be made suitable for this work through careful control of production.

Music-wire springs can attain the greatest tensile strength of any wire, and when coiled in small diameters, the tensile strength is often increased, so that the duty of cutting puts extra strains on the tools.

The first music-wire springs, in the production of which sintered-carbide arbors were used, were extremely small fitting springs, in which 0.022 in. wire was coiled to 0.072 in. diameter. The successful production of these springs led to the development of greater shock resistance in sintered carbides and the cutting of larger diameters both on automatic coilers and on tortion-spring machines. Recently, a Firthaloy arbor has been putting No. 8 music wire, 0.162 in. in diameter, made into springs with an inside diameter of $\frac{7}{16}$ in. No. 3 Sleeper and Hartley automatic machines.

Working with such heavy and hard material, the best high-speed steel arbors have been found either to break or lose their edge after a few thousand cuts, while the new sintered carbide arbor has made 500,000 to 1,000,000 springs without regrinding. The tensile strength on such heavy wire is about 275,000 lbs. per square in. after coiling, which gives a corresponding Rockwell hardness of about 48 on the C scale. Representing the exactness to which springs must now be made is an aircraft-carbureter spring, being produced by the Illinois Coil Spring Company. This spring, the testing of which is illustrated, is made of 0.065 in. music wire. It must have a free length of 4 in. and is given two compression tests. It must compress from 2.801 to 2.756 in. under a weight of $8\frac{1}{2}$ lbs., and 3.686 to 3.641 in. under a weight of 2 lbs. In order to secure this accuracy at these rates of deflection, the pitch and diameter must be uniform or the rate of deflection will show wide variations. These springs are later heat-treated at 450 F. for 20 min. after being cadmium plated.

ROUND TABLE

Blank Check

"Ed, we've got to find some way for controlling those small, incidental expenses in the shop now charged to blanket orders by the foremen. Both of us know how easy it is for the foreman to use such orders like a blank check. Of course we insist on larger expenses being charged to a separate order, but the small repairs are billed to a blanket order to save accounting costs."

"The blanket-order scheme still is working out satisfactorily over at our place, Al, just as it did when you were there. At least, I haven't heard any complaints about my charges running too high. Maybe you've just forgotten how much it costs to do some of those little jobs."

"Not a bit of it, Ed. I've a fair idea of what it costs to do even the simplest job in the shop, but business conditions nowadays make it darned important for me to watch every expenditure closely. I'm darned sure that a little more control on my part would result in expense reductions. I think I'd better insist on each job being done on a separate order."

"You'll shoot your accounting

costs up more than you'll save by checking every little item, Al. Better be a little more confident of the interest your foremen take in their jobs and trust them to cut out the non-essentials. Surely they know when it is better to spend a dollar for a new clamp screw in a jig, rather than run the risk of scrapping a twenty-dollar casting."

Is the blanket-order scheme for controlling shop expenses misused; can it be eliminated?

DISCUSSION

Castings in the Yard

Alfred O. Blumenthal writes that the men usually learn from their supervisors whether work is plentiful and keeping the castings in the yard until they are needed will make the shop a better place in which to work. A similar view is taken by G. McArdle, who says that "among industrious workers the quality of work does not go down when work is slack; it is only the slipshod minority who start to lag when they see the work dwindling."

Harry A. Gilliland, of Hamilton, Ontario, Canada, points out that the efficiency of the shop should not suffer when business slackens where a standard time system is used, as the men will not drop below the time set for the operation. A case of housecleaning is cited by Mr. Gilliland to show that shop efficiency can be improved by taking the castings out into the yard from around the machines. On the other hand, Arthur Silvester says that the men are more efficient and more contented when there is a large volume of work ahead and that there is a tendency to slow down when things are slack, even though piece-work rates are used.

Sore Thumb

"Al's idea of displaying spoiled work is sound," writes F. L. Ingleright, superintendent of the Bradford Motor Works. He believes that no customer ever carries away a bad impression of a shop that can show that it knows why parts have been rejected. He points out that "the unusual spectacle of a display board loaded with rejected parts will create a better impression than one showing choice selections of the other extreme." A similar scheme developed by Mr. Ingleright is to post weekly lists showing each workman's name and the total catalog value of the parts he has spoiled. J. Murphy, writing in much the same vein, says that he has found a display of spoiled work an excellent way to shame the man who doesn't care into doing better work. However, he advises the use of judgment when dealing with the sensitive man who seldom makes an error. In these cases, says Mr. Murphy, it often is better to throw the piece in the scrap pile and forget it.

On the other hand, Robert S. Alexander writes that "you cannot shame a man into efficiency because most of the men already are sold on that idea, but you can talk to a man and point out the cost of the mistake without parading that mistake before his shop-mates." Agreeing in principle with Mr. Alexander, L. H. Davy says "If Al wants to humiliate and embarrass his employees, the board displaying defective work will do the trick. No conscientious workman makes a mistake intentionally, neither does he like to have his blunders hung up where all can see."

Shock Absorber

"You can knock any planning system in to a cocked hat by the unexpected failure of equipment or through the rearrangement of schedules because of special orders, and under such conditions there is nothing quite so handy as a 'shock absorber' or two in the shop," says O. W. Winter. W. E. Warner, of London, England, however, thinks it uneconomical to even out production by employing a man to run old machines.

Gift Horse

C. D. Mackinnon of Lanarkshire, Scotland, writes to say that the supervisor who accepts a gift from any employee is skating on thin ice. The best gift that an employee can give his supervisor, thinks Mr. Mackinnon, is that of loyalty and service.

IDEAS FROM PRACTICAL MEN

Fixture for Dressing Special Shapes

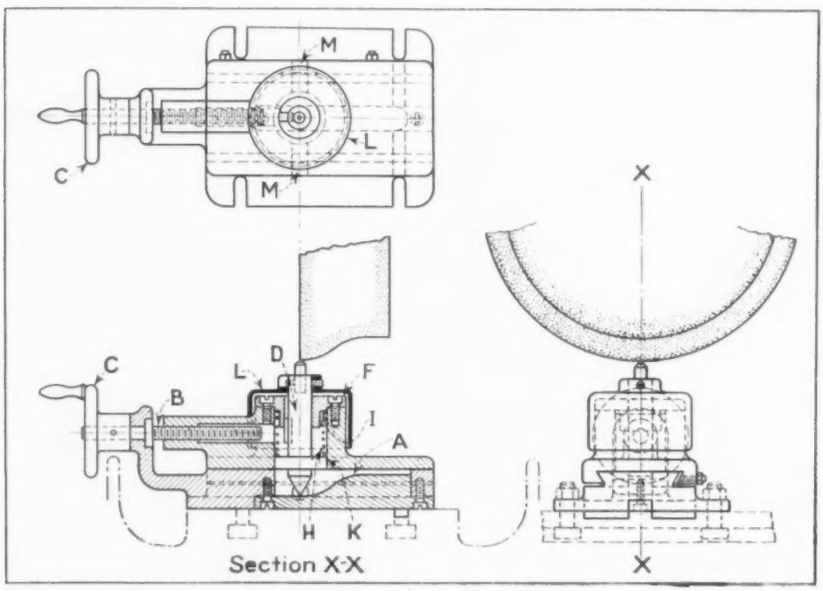
J. R. WHITTLES

The fixture illustrated is for dressing abrasive wheels for grinding work to special shapes in the surface grinder. The under part of the base is recessed to accommodate the hardened steel former plate *A* which is the same shape as that of the work to be ground. The upper part of the fixture slides on the base, motion being transmitted to it by the screw *B* operated by the handwheel *C*. The diamond holder *D* is held vertically in the bearing *F* in which it is free to slide up and down, but is prevented from turning by a key. Its lower end is pointed and bears on the former plate, being kept in contact with it by the spring *H* which is confined between the flange *I* on the bearing and the collar K on the lower part of the diamond holder.

Thus it will be seen that as the diamond is traversed across the face of the wheel it will be moved up and down by the former plate and the spring and will dress the wheel to the same shape, but in reverse, as that of the former plate. The water guard *L* protects the upper part of the diamond holder and the bearing from grit carried by the coolant.

The fixture is positioned by the regular cross slide of the machine so that the former plate will be in correct relation to the wheel, the peep holes *M* in the base being used in sighting the setting.

Depth of cut is controlled by lowering the wheel head, the diamond just touching the wheel at first. Then the wheel head is lowered slightly and the diamond is traversed across the face of the wheel. This process is repeated until the face of the wheel has been dressed to the full shape.

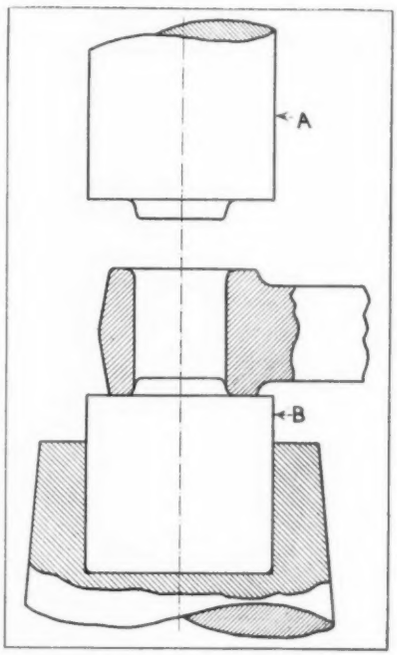


The diamond holder is held vertically, its lower end being in contact with a former plate by which it is guided in dressing the wheel to shape

Riveting Machine Rounds Edges of Holes

LESTER MENGEL
High-Speed Hammer Company, Inc.

An inexpensive method of rounding the edges of holes in work is by the use of a high-speed riveting hammer. Both the head *A* and the anvil B are hardened steel and are provided with short pilots that are filleted at their bases, as shown in the illustration.



Edges of the hole are rounded by a few blows of a riveting hammer equipped with a formed head and an anvil

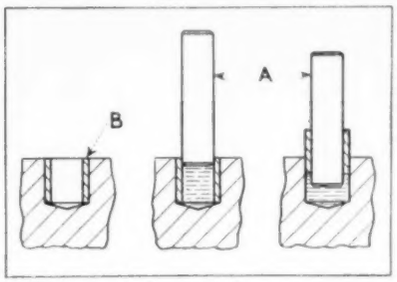
A few blows of the hammer will produce very smooth rounded edges at both ends of the hole and at the same time tend to flatten the upper and lower surfaces of the work by what practically amounts to a coining operation.

Removing Bushings From Blind Holes

J. KARASH
Tool Design Department
Reliance Electric & Engineering Company

The accompanying sketch illustrates a simple and efficient method of removing bushings from blind holes.

The rod *A* is ground for a good snug fit in the bushing *B* and a light grade of oil is poured into the bushing until it is nearly but not quite full. The rod *A* is then entered in the bushing and its outer end is struck with a hammer, forcing the oil between the inner end of the bushing and the bottom of the hole. Since oil is an incompressible fluid,



Bushings in blind holes can be removed by partly filling them with oil and hammering on a close fitting rod inserted in their outer ends

the hydraulic action thus set up will start the bushing from the hole. Continued blows with the hammer on the rod will force the bushing out entirely.

Free-Turning Handles

F. H. MARTIN

This article is the result of a remark made by a machinist in reference to free-turning handles on handwheels and levers of machines. He said, "Why the fancy gadgets on the handwheels and levers? Just squirt a little machine oil in the palm of your hand and the nice shiny handle will turn easily in it." However, it was not until that machinist's greasy hand had slipped from a solid handle, resulting in skinned knuckles, did he think the fancy gadgets were fine things and a boon to machine operators.

The various types of handles illustrated are easy on the hands. In all cases the principle is the same: The center spindle is fastened solidly into the handwheel or lever, the handle part being free to turn or spin on the spindle.

In Fig. 1, the headed stud is merely pressed tightly into the rim of the handwheel. In some cases the hole will go entirely through the rim, so that if the stud is pressed in too far and binds the handle, it can be backed out enough to permit the handle to turn freely. The head of the stud is rounded to conform to the rounded end of the handle.

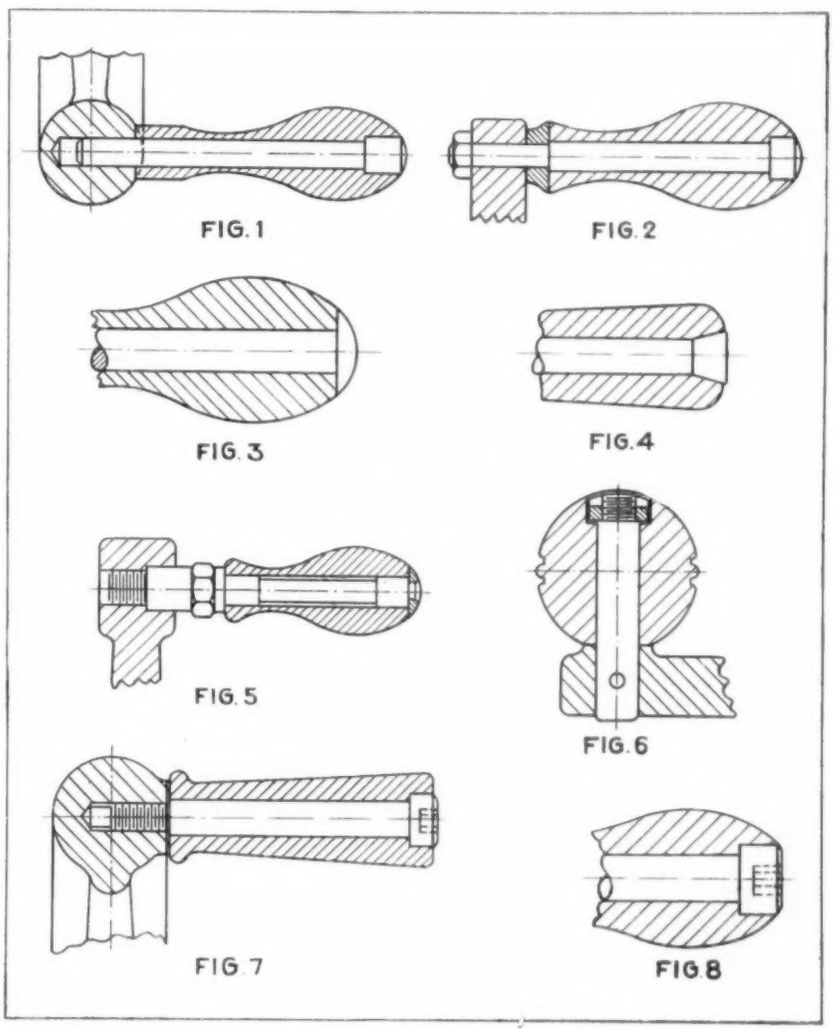
The outer ends of the handle and the stud in Fig. 2 are similar to those in Fig. 1, but the inner end of the stud is shouldered and threaded, the shoulder being drawn tightly against the formed collar by the nut. The length between shoulders on the stud is about 0.005 in. greater than the distance from the outer end of the handle to the shoulder formed by the counterbored hole.

In Fig. 3, a large-head rivet is used as a stud, the rounded portion of the head being a continuation of the end of the handle. The inner end may be shouldered and pressed into the handwheel or lever, or left plain and cross pinned. A cone head rivet is used as a stud in Fig. 4, its inner end receiving the same treatment as that in Fig. 3. In the design in Fig. 5, cold-drawn hexagon stock turned to the various diameters shown is used for the stud. The inner end is threaded and shouldered, the shoulder bottoming in the counterbored hole. By inserting the stud in the counterbored hole instead of merely screwing the threaded portion in to the shoulder, a stronger assembly is secured. The outer end of the stud is turned to match the spherical-shaped washer, which is retained by riveting the end of the stud. The central bearing surface is relieved, leaving a bearing at each end of the handle.

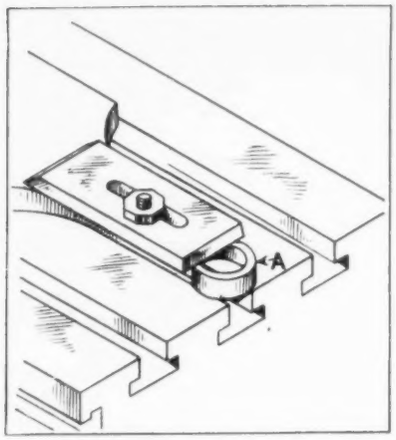
The arrangement shown in Fig. 6 is a hard rubber or plastic knob rotating freely on a stud, the upper part of which is turned to form a shoulder, the end being threaded to receive a slotted nut. This design can be modified by turning a head on the upper end of the stud and shouldering the lower end that is pressed into the lever as was done in Fig. 5.

A commercial socket-head stripper bolt is utilized as a stud in Fig. 7. Such bolts are generally made of alloy steel and are hardened and ground. They are available in various lengths between shoulders, so that the length of the handle can be made as required. The end of the head is chamfered to approximately 30 deg. with the axis, thus allowing a pleasing projection at the end of the handle.

In Fig. 8, the use of a stripper bolt as a stud is shown with a handle having a rounded grip. The curve shown at the end of the handle is blended into the 30-deg. chamfer of the stud end.



These types of free-turning handles are easy on the hands. Some of the studs are special, while others can be bought in the open market



Clamp heels made from pipe are light, cheap and easy to handle. They can be used singly or in any combination to give the correct height

Clamp Heels Made From Pipe

C. F. FITZ

Men having work to be clamped to machine tables often have to hunt around the shop for clamp heels and then use anything they can get their hands on, regardless of what it is or how well it meets their needs. So that we always have the necessary heels at hand, we make them from 1¼-in. pipe, as shown at *A* in the illustration. The heels are cut to various lengths and their heights are stamped on them.

The heels may be used singly or in any combination that will give the desired height. They are light in weight and are very easy to handle as compared with some of the heels and packing blocks used in many shops. The outstanding point in their favor is their cheapness, since most shops have odds and ends of pipe lying around that can be used for making clamp heels, thus saving the time of the workmen.

Toolholder of Increased Usefulness

O. D. BRADSHAW
Plant Engineer,
T. McAvity & Sons, Ltd.,
Saint John, New Brunswick, Canada

Although Peter L. Budwitz does not mention (*AM*—Vol. 82, page 288), I presume that the type of toolholder he refers to is one in which the broached hole for the toolbit is parallel lengthwise to the bottom of the holder.

When considering a toolholder of the Armstrong type, in which the broached hole is at an angle lengthwise to the bottom of the holder, it would be necessary accurately to locate and broach the auxiliary hole so that the bottom surfaces of both holes will be in the same plane at the point of intersection. Otherwise, when the toolbit was inserted in one or the other of the holes there would be a slack spot or depression under it in line with the clamping screw.

By keeping that point in mind when broaching the auxiliary hole, it would follow that when the toolbit was inserted in that hole it would not be square with the bottom of the holder. That would necessitate grinding considerable clearance on the cutting edge of the toolbit when using it as a boring tool.

The majority of toolbit failures have been due to insufficient support under the clamping screw, caused by actual wear in some cases and to incorrect machining and heat-treating in others. In the "Ready" type of toolholder, a hardened support is inserted under the toolbit.

In boring shallow holes of large diameter, I have found that an offset toolholder adjusted to the proper angle and height serves the purpose very well. It would not apply, of course, in machining recesses or facing blind shoulders. By observing the clearance on the toolbit in Mr. Budwitz's illustration it would appear that such was the use to which he intended putting his improvised boring tool. In this event it would be necessary (if an Armstrong type of holder were used) to grind relief on that portion of the toolbit projecting from the holder and facing toward the headstock of the lathe.

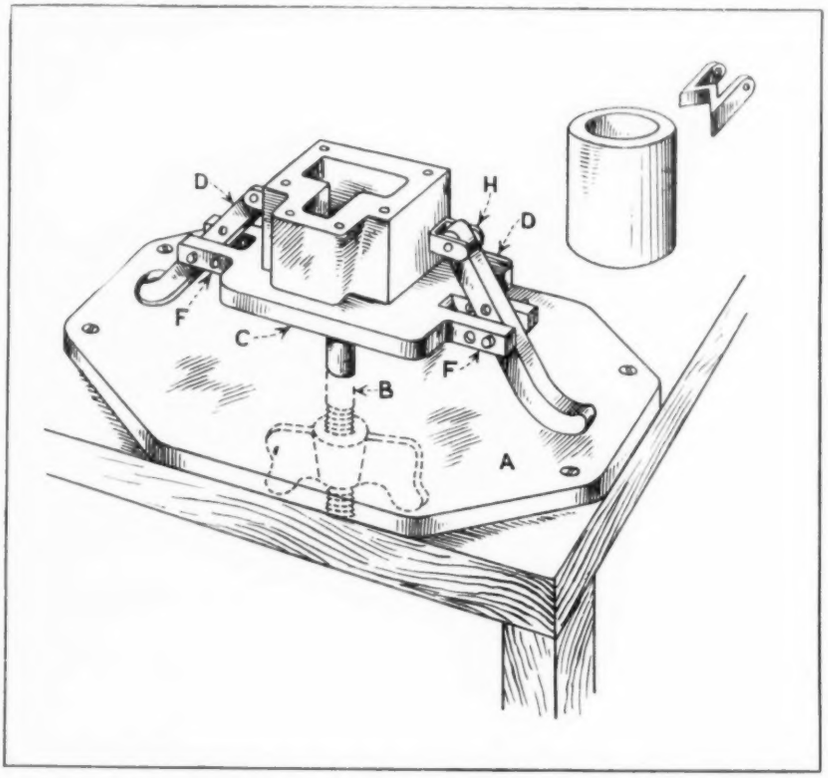
Swivel Vise for the Bench

CHARLES H. WILLEY
Superintendent of Manufacturing,
Hoyt Electrical Instrument Works

Work that is too large for the ordinary bench vise and not heavy enough to stay put on the bench of its own weight while it is being chipped or filed can be held in the device illustrated.

The steel plate *A* is attached to the bench by through bolts and has a hole in its center to permit passage of the clamping bolt *B* for drawing down the swivel plate *C*, together with the dogs *D* and the lugs *F* in which they are pivoted. The dogs and the lugs have two or more holes for the pivot pins so that adjustment can be made for holding work of various widths and heights. Round work can be held by making the self-adjusting pads *H* on the dogs in the form of V-blocks as shown.

In use, the work is adjusted to the most suitable horizontal angular position and its weight will cause the dogs to grip it lightly.



The weight of the work will cause the dogs to clamp it lightly. Further gripping pressure is applied by turning the thumbnut under the bench

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 4

Thread Grinding on Hardened, Undercut Studs—I

PART:

Heat-treated, chrome-nickel steel undercut studs having a hardness of 32-36 Rockwell.

OPERATION:

Rough and finish grind threads only.

WORK STATION:

Standard 6 x 18-in. thread grinding machine.

LOCATION:

Wright Aeronautical Corporation, Paterson, N. J.

ALLOWED TIME—MINUTES:

These standards are for grinding one end of the stud only, rough and finish grinding are separate operations. Grinding the second end of the stud constitutes a second operation, for which these allowances also apply. Rough grind from solid stock.

Diameter Inches	Pitch	Thread Length	Rough Grind Minutes	Work Speed R.P.M.	Finish Grind Minutes	Work Speed R.P.M.
5/16	16	3/8	0.48	47	0.62	60
5/16	18	3/8	0.48	50	0.62	62
5/16	20	3/8	0.48	54	0.62	65
5/16	24	3/8	0.49	63	0.47	63
5/16	16	7/16	0.50	47	0.62	60
5/16	18	7/16	0.51	50	0.62	62
5/16	20	7/16	0.51	54	0.62	65
5/16	24	7/16	0.56	63	0.51	63
5/16	16	1/2	0.52	47	0.63	60
5/16	18	1/2	0.54	50	0.63	62
5/16	20	1/2	0.54	54	0.63	65
5/16	24	1/2	0.56	63	0.54	63
5/16	16	9/16	0.55	47	0.63	60
5/16	18	9/16	0.56	50	0.63	62
5/16	20	9/16	0.58	54	0.63	65
5/16	24	9/16	0.59	63	0.57	63
5/16	16	5/8	0.58	47	0.63	60
5/16	18	5/8	0.61	50	0.63	62
5/16	20	5/8	0.61	54	0.63	65
5/16	24	5/8	0.62	63	0.60	63
5/16	16	11/16	0.61	47	0.63	60
5/16	18	11/16	0.63	50	0.63	62
5/16	20	11/16	0.63	54	0.63	65
5/16	24	11/16	0.66	63	0.64	63
5/16	16	3/4	0.66	47	0.63	60
5/16	18	3/4	0.66	50	0.63	62
5/16	20	3/4	0.67	54	0.63	65
5/16	24	3/4	0.70	63	0.67	63
5/16	16	13/16	0.68	47	0.64	60
5/16	18	13/16	0.69	50	0.64	62
5/16	20	13/16	0.69	54	0.64	65
5/16	24	13/16	0.73	63	0.70	63
5/16	16	7/8	0.71	47	0.64	60
5/16	18	7/8	0.73	50	0.64	62
5/16	20	7/8	0.73	54	0.65	65
5/16	24	7/8	0.76	63	0.73	63
5/16	16	15/16	0.74	47	0.64	60
5/16	18	15/16	0.77	50	0.65	62
5/16	20	15/16	0.77	54	0.67	65
5/16	24	15/16	0.80	63	0.77	63
5/16	16	1	0.77	47	0.65	60
5/16	18	1	0.79	50	0.67	62
5/16	20	1	0.81	54	0.70	65
5/16	24	1	0.83	63	0.80	63
5/16	16	1 1/16	0.80	47	0.66	60
5/16	18	1 1/16	0.82	50	0.70	62
5/16	20	1 1/16	0.83	54	0.72	65
5/16	24	1 1/16	0.87	63	0.83	63
5/16	16	1 1/8	0.83	47	0.70	60
5/16	18	1 1/8	0.86	50	0.73	62
5/16	20	1 1/8	0.86	54	0.75	65
5/16	24	1 1/8	0.90	63	0.86	63
5/16	16	1 3/16	0.85	47	0.72	60
5/16	18	1 3/16	0.89	50	0.76	62
5/16	20	1 3/16	0.86	54	0.77	65
5/16	24	1 3/16	0.93	63	0.89	63
5/16	16	1 1/4	0.90	47	0.73	60
5/16	18	1 1/4	0.91	50	0.77	62
5/16	20	1 1/4	0.92	54	0.80	65
5/16	24	1 1/4	0.97	63	0.93	63
3/8	14	3/8	0.50	36	0.63	46
3/8	16	3/8	0.51	38	0.63	48
3/8	20	3/8	0.51	47	0.62	53
3/8	24	3/8	0.53	52	0.51	52

Note: The term "allowed time" used in these and following data represents the time requird by any worker to perform the given unit of work, using average skill, showing average effort, under average conditions, with average consistency, allowing for fatigue, personal needs and unavoidable *delays. It is the time within which the worker is expected to perform that work.* All times shown above are in decimal minutes. Accurate conversions to decimal hours and seconds can be made by means of the following formulas: Decimal minutes X 0.01667=decimal hours; decimal minutes X 60=decimal seconds. The data given represents standards developed for use at the Wright Aeronautical Corporation's plant at Paterson, N. J., for conditions of work existing in that plant. Each allowance should be checked in the light of local conditions before being applied in any other plant.

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 5

Thread Grinding on Hardened, Undercut Studs—II

Diameter Inches	Pitch	Thread Length	Rough Grind Minutes	Work Speed R.P.M.	Finish Grind Minutes	Work Speed R.P.M.
3/8	14	7/16	0.52	36	0.63	46
3/8	16	7/16	0.54	38	0.63	48
3/8	20	7/16	0.55	47	0.63	53
3/8	24	7/16	0.57	52	0.55	52
3/8	14	1/2	0.56	36	0.63	46
3/8	16	1/2	0.58	38	0.63	48
3/8	20	1/2	0.59	47	0.63	53
3/8	24	1/2	0.61	52	0.59	52
3/8	14	9/16	0.60	36	0.63	46
3/8	16	9/16	0.62	38	0.63	48
3/8	20	9/16	0.62	47	0.63	53
3/8	24	9/16	0.65	52	0.63	52
3/8	14	5/8	0.62	36	0.63	46
3/8	16	5/8	0.66	38	0.63	48
3/8	20	5/8	0.67	47	0.63	53
3/8	24	5/8	0.70	52	0.67	52
3/8	14	11/16	0.67	36	0.64	46
3/8	16	11/16	0.69	38	0.64	48
3/8	20	11/16	0.70	47	0.63	53
3/8	24	11/16	0.74	52	0.71	52
3/8	14	3/4	0.69	36	0.64	46
3/8	16	3/4	0.74	38	0.64	48
3/8	20	3/4	0.74	47	0.65	53
3/8	24	3/4	0.78	52	0.75	52
3/8	14	13/16	0.74	36	0.64	46
3/8	16	13/16	0.77	38	0.65	48
3/8	20	13/16	0.78	47	0.68	53
3/8	24	13/16	0.82	52	0.78	52
3/8	14	7/8	0.77	36	0.65	46
3/8	16	7/8	0.81	38	0.67	48
3/8	20	7/8	0.81	47	0.71	53
3/8	24	7/8	0.86	52	0.83	52
3/8	14	15/16	0.81	36	0.68	46
3/8	16	15/16	0.85	38	0.71	48
3/8	20	15/16	0.85	47	0.75	53
3/8	24	15/16	0.90	52	0.87	52
3/8	14	1	0.84	36	0.71	46
3/8	16	1	0.89	38	0.73	48
3/8	20	1	0.90	47	0.77	53
3/8	24	1	0.94	52	0.90	52
3/8	14	1 1/16	0.87	36	0.72	46
3/8	16	1 1/16	0.92	38	0.76	48
3/8	20	1 1/16	0.93	47	0.81	53
3/8	24	1 1/16	0.99	52	0.95	52
3/8	14	1 1/8	0.91	36	0.75	46
3/8	16	1 1/8	0.95	38	0.80	48
3/8	20	1 1/8	0.97	47	0.83	53
3/8	24	1 1/8	1.03	52	0.98	52
3/8	14	1 3/16	0.95	36	0.78	46
3/8	16	1 3/16	1.00	38	0.83	48
3/8	20	1 3/16	1.01	47	0.87	53
3/8	24	1 3/16	1.07	52	1.02	52
3/8	14	1 1/4	0.98	36	0.81	46
3/8	16	1 1/4	1.04	38	0.86	48
3/8	20	1 1/4	1.05	47	0.89	53
3/8	24	1 1/4	1.11	52	1.06	52
7/16	12	3/8	0.54	24	0.63	40
7/16	14	3/8	0.54	30	0.63	40
7/16	16	3/8	0.54	32	0.63	41
7/16	20	3/8	0.57	37	0.51	45
7/16	12	7/16	0.57	24	0.63	40
7/16	14	7/16	0.57	30	0.63	40
7/16	16	7/16	0.60	32	0.63	41
7/16	20	7/16	0.62	37	0.54	45
7/16	12	1/2	0.61	24	0.63	40
7/16	14	1/2	0.61	30	0.63	40
7/16	16	1/2	0.64	32	0.63	41
7/16	20	1/2	0.67	37	0.59	45
7/16	12	9/16	0.66	24	0.63	40
7/16	14	9/16	0.66	30	0.64	40
7/16	16	9/16	0.68	32	0.64	41
7/16	20	9/16	0.72	37	0.62	45
7/16	12	5/8	0.72	24	0.63	40
7/16	14	5/8	0.69	30	0.64	40
7/16	16	5/8	0.73	32	0.64	41
7/16	20	5/8	0.76	37	0.66	45
7/16	12	11/16	0.76	24	0.64	40
7/16	14	11/16	0.74	30	0.64	40
7/16	16	11/16	0.77	32	0.65	41
7/16	20	11/16	0.81	37	0.70	45
7/16	12	3/4	0.79	24	0.64	40
7/16	14	3/4	0.78	30	0.64	40
7/16	16	3/4	0.83	32	0.67	41
7/16	20	3/4	0.86	37	0.75	45
7/16	12	13/16	0.84	24	0.64	40
7/16	14	13/16	0.83	30	0.68	40
7/16	16	13/16	0.86	32	0.72	41
7/16	20	13/16	0.91	37	0.77	45
7/16	12	7/8	0.88	24	0.64	40
7/16	14	7/8	0.87	30	0.71	40
7/16	16	7/8	0.91	32	0.75	41
7/16	20	7/8	0.96	37	0.77	45
7/16	12	15/16	0.92	24	0.67	40
7/16	14	15/16	0.91	30	0.73	40
7/16	16	15/16	0.95	32	0.78	41
7/16	20	15/16	1.01	37	0.84	45
7/16	12	1	0.96	24	0.70	40
7/16	14	1	0.96	30	0.76	40
7/16	16	1	1.00	32	0.82	41
7/16	20	1	1.06	37	0.88	45
7/16	12	1 1/16	1.01	24	0.72	40
7/16	14	1 1/16	1.00	30	0.79	40
7/16	16	1 1/16	1.04	32	0.86	41
7/16	20	1 1/16	1.10	37	0.92	45
7/16	12	1 1/8	1.05	24	0.75	40
7/16	14	1 1/8	1.04	30	0.83	40
7/16	16	1 1/8	1.09	32	0.88	41
7/16	20	1 1/8	1.14	37	0.96	45
7/16	12	1 3/16	1.09	24	0.78	40
7/16	14	1 3/16	1.08	30	0.86	40
7/16	16	1 3/16	1.14	32	0.91	41
7/16	20	1 3/16	1.19	37	0.99	45

(To be continued in an early issue.)

NEWS OF THE INDUSTRY

Effect on Users of Upset in Steel Pricing System Is Not Yet Clear

New policy appears to encourage decentralization of steel making and creation of favored steel-consuming zones

NEW YORK—The unexpected action of steel companies in turning their price structure topsy-turvy has not yet been accurately appraised. Neither steel executives nor steel users can foresee what will result from the virtual abandonment of the basing point system of pricing steel, as it has existed heretofore, in favor of an "f.o.b. mill" basis.

United States Steel started things by putting its base prices at Chicago and Birmingham at the same level as its Pittsburgh prices. Previously Pittsburgh had enjoyed a $2 a ton differential over Chicago and $3 over Birmingham. Bethlehem quickly followed by naming Buffalo, Bethlehem and Sparrows Point, where it has important mills, as basing points on products manufactured there, the prices being the same as at Pittsburgh. Other steel makers then hastened to name their mill cities as basing points —Great Lakes Steel at Detroit (with a $2 a ton differential over Pittsburgh instead of the former $4 a ton), Granite City Steel at Granite City, Ill., Youngstown Sheet & Tube at Youngstown, and Republic Steel at its mill cities.

Coming on top of a slash in steel prices inaugurated by United States Steel, the scrapping of the long-recognized price structure has put the steel industry and steel consumers afog. What will happen is anyone's guess. On the surface, it would appear that a number of favored zones for fabricated steel would be set up around steel producing centers. The closer a steel user is to a mill supplying his raw material, the less freight he must pay. Moreover, steel users in centers like Detroit no longer have to pay a freight rate from Pittsburgh to Detroit. The Birmingham user no longer pays $3 a ton above the Pittsburgh price. Unless something is done to change the situation, therefore, one may find steel consuming plants clustered around steel mills.

It is believed that United States Steel's abandonment of a Pittsburgh-favored price basis was motivated by three factors: completion of its mill modernization program in the Pittsburgh, Chicago and Birmingham districts; the court fight by the Federal Trade Commission against "Pittsburgh plus"; and the impending government anti-monopoly investigation.

The smaller steel mills say that if the government hoped to favor the little fellow by elimination of "Pittsburgh plus" or its equivalent, the fact is that the opposite result may be accomplished. They have been put at a disadvantage in the solicitation of tonnage in markets far removed from their mills. Wickwire-Spencer, for example, has wire mills at Worcester, Mass., and Buffalo. It does a considerable business in the South. The potential tonnage near its mills is not sufficient even in good times to absorb all of its output, yet under the new set-up it will become exceedingly tough for the company to maintain its position in the South.

The steel company which wishes to compete outside of its immediate mill zone and in the favored zone of a competitor will have to make a choice between putting a new mill at the "hot spot," if it sees sufficient

LATE *NEWS* WIRES

BOSTON—Pratt and Whitney Aircraft Division of United Aircraft has received airplane engine orders for 128 units from War Department at cost of $662,534. Increased activity is noted in modernization movement with National Biscuit starting a $500,000 plant improvement and Lever Brothers expanding its Cambridge plant. Marblehead and Derby Central Stations are buying power generating equipment.

CHICAGO—Railroads are increasing employment. Burlington put back 650 men at its Aurora, Ill., shops and 250 at Lincoln, Neb. Santa Fe has returned 8,000 shop employees to five days a week after being on a three-day week since May 1. International Harvester has closed seven plants for month of July, but East Moline Works is not affected and truck plants at Fort Wayne, Ind., and Indianapolis are operating on reduced schedules. With new steel pricing set-up, it is probable that Youngstown Sheet & Tube may push expansion of mills at Indiana Harbor.

DETROIT—Automotive men are beginning to talk about possibility of a used car shortage in the fall. Used car stocks have been pared sharply since early spring. Chevrolet alone sold 123,701 used cars in June. Automobile production in first six months of 1938 was 1,301,033 units. New car and truck sales during June are estimated at close to 200,000 units or considerably above early expectations.

WASHINGTON—Restoration and preservation of private competitive capitalism is the professed objective of the joint Legislative-Executive monopoly investigation. The Committee seems to feel that the greatest immediate needs are to prevent the freezing of prices and to make it clear what business may or may not do. The Committee estimates that at least 45% of the price structure is frozen at present. There is unanimous opinion among the Committee members that capitalism cannot endure half flexible and half frozen.

tonnage there, or absorbing the freight differential with which its competitor is not burdened. If it adopts the latter course, a good slice of its earnings may be sacrificed. The small steel producer contends that this "squeeze play" favors the big company with ample resources to build new mills at strategic points. Whatever the result for the little fellow, the new system appears to encourage decentralization of steel manufacture.

The present confused status of the industry already has revived talk about the possibility that new mills may be built at or near Detroit, which is the center of one of the richest steel consuming areas in the country. One should remember, however, that it would hardly be economical to put a finishing mill at Detroit without creating raw steel making capacity too and that would cost many millions.

Steel companies in the Pittsburgh district are expected to take full advantage of facilities for shipping steel by water to midwest and southwestern cities. The Ohio River has long been used by such companies as Carnegie-Illinois and Jones & Laughlin.

Whatever happens, steel users stand to gain. Prices have been lowered $3 to $8 a ton. In addition, consumers near mills now save a considerable amount which previously had been paid as freight from remote basing points to point of consumption.

Carnegie-Illinois reduced prices, it is believed, partly in response to the hammering on this subject trom the White House and from other federal government sources. The plan is that the industry should follow the price hunch of Washingtonians and see whether reductions will stimulate buying. Steel people privately are skeptical that price decreases will bring out a pound more of tonnage.

Temporarily the industry will not attempt to revise wages downward to put them more in line with steel prices. United States Steel has denied, however, that it made any promises to the White House that wages would stay pegged where they are despite lowered prices. To experienced observers a reduction in the steel wage scale seems inevitable. When it comes, it is doubtful that the C.I.O. will put up too much opposition to it. Until the steel operating rate advances materially, the main result of the upheaval in the steel industry will be increased financial losses and keener competition for available tonnage.

Shipbuilding Industry Enjoys a Strong Upturn in First Half of 1938

Its revival is stimulating employment and business in 31 states that supply fabricated metal products

H. R. LE GRAND
Assistant Editor, American Machinist

NEW YORK—Things are looking up in the shipbuilding industry. Expanding activity of the Maritime Commission and of private operators has caused a 139 per cent increase in commercial tonnage under contract in the short space of six months. At the close of 1937 merchant ships under construction totaled 189,000 tons. On July 1 contracts in hand amounted to 452,780 tons, according to a report (see table) compiled for *American Machinist* by the National Council of American Shipbuilders.

The July 1 figure does not include small vessels. It is limited to ships of 2,000 gross tons or over. In addition, the report shows that the 452,780 tons are in the hands of seven yards. Since there are nineteen yards that have ways capable of handling 300-ft. vessels (between 2,000 and 3,000 tons), it is evident that a number of ways are still available for further building if the Maritime Commission should decide to embark at least partially on its ambitious program of 500 new ships in the next ten years.

At the moment, naval tonnage in private yards is below the figure at the end of 1937. A number of ships have been completed, and the naval expansion program is slow in getting up steam. There is talk of financing construction in Navy yards by means of PWA funds, despite previous experience that has shown Navy yard labor costs to be about one and one-half times those in private yards. But after the jockeying around has ended, it is likely that shipbuilders will get a good share of the tonnage for which the Navy can get appropriations.

The best source of orders for commercial vessels is the Maritime Commission. Rear Admiral Emory S. Land, who succeeded Joseph P. Kennedy after the latter's acceptance of the ambassadorship to Great Britain, has reiterated his predecessor's demand for building up the merchant marine. The plan is to build 500 ships in ten years at a cost of $1,250,000,000. Observers say that the plan is too ambitious and that it will never be fulfilled. Nevertheless, the Commission has awarded 33 ships this year at an approximate cost of $92,000,000, and Admiral Land expects to have contracts for more by the end of the year. Presumably these ships will include the group of 24 to be built for rehabilitation of Pacific Coast shipping.

American Export Lines opened bids on May 17 for four steam-propelled steel cargo vessels of 14,450 tons displacement and 475 ft. long. These are slightly larger than the C-2 design, which comprises the bulk of the Maritime Commission's present contracts.

The drawback with respect to other shipping companies crashing through with orders is that most of the operators are in a poor way financially. They can't raise the down payment, which is 25 per cent of the foreign

Both Navy and private yards are building 1,500 ton destroyers. Here is the *U.S.S. Ellet* sliding down the ways of the Federal Shipbuilding & Dry Dock Co. on June 11

Private Yard Construction

Self-Propelled Seagoing Commercial and Naval Tonnage Under Contract and Undelivered as of July 1, 1938

(Compiled by the National Council of American Shipbuilders)

	Commercial		Naval	
	No.	Gross Tons	No.	Displacement
Bath Iron Works	.....	.....	7	10,050
Bethlehem Shipbuilding Corp.				
Fore River Plant	3	27,000	3	17,500
Sparrows Point	11	91,500	.....	.....
Union Plant	.....	.....	2	3,000
Electric Boat Corp	.....	.....	9	13,050
Federal Shipbuilding & Drydock Corp.	11	94,300	5	7,500
Newport News Shipbuilding & Drydock Corp	9	90,630	4	23,000
New York Shipbuilding & Drydock Corp	.....	.....	3	27,300
Pusey & Jones Corp	1	2,500	.....	.....
Sun Shipbuilding & Drydock Corp	13	117,250	.....	.....
Tampa Shipbuilding & Drydock Corp.	4	29,600	.....	.....
	52	452,780	33	101,400

Distribution of Ways

Capable of Building Ships 300 Ft. and Over

(Excluding Great Lakes and Rivers)

	Active	Inactive but capable of repair at nominal expense
North Atlantic	53	13
South Atlantic (South of Baltimore)	6	2
Gulf Coast	4	5
Pacific Coast	8	6
	71	26

Navy Yard Construction

(Up to July 1, 1938)

Yard	Ships	
	Keel laid, but not launched	Keel not laid
Boston	2 destroyers	4 destroyers
Charleston	2 destroyers	1 destroyer
Mare Island	1 submarine	1 submarine tender
New York	1 battleship 1 light cruiser	
Norfolk	.....	2 destroyers
Philadelphia	2 destroyers	1 battleship
Portsmouth	2 submarines	4 submarines
Puget Sound	1 destroyer	1 destroyer 2 seaplane tenders

cost as provided in the amended 1936 Merchant Marine Act. The Government would take a first mortgage for the 75%, and would require operation under the American flag.

If the Commission cannot sell the ships it builds, it may charter them to the highest bidder, and allow subsidies under certain conditions. Charter hire amounts to 5 per cent per annum of the American cost, and it may be reduced to 5 per cent of the foreign cost (60% of American cost). An operator could charter five ships for the down payment on one ship.

The economics of the shipping trade are mighty involved, as Mr. Kennedy found out when he prepared his famous survey. It is too early yet to predict how much more business the shipbuilders are likely to get, because the operating companies are still mulling over the problem of whether to buy, to charter or to let well enough alone.

But the most important point is that the shipbuilding industry is now giving widespread employment and distribution of orders. It is doing so on a larger scale than last December. The National Council of American Shipbuilders says that 40 per cent of the cost of a vessel goes to labor in the shipyard. Another 50 per cent goes outside for materials and equipment, which in the last analysis means payment for labor.

All of the states bordering on the Atlantic, Pacific and Gulf coasts have shipyards, and most of them have yards with ways capable of constructing 300-ft. seagoing vessels (See table of geographical distribution of such ways). Thus, yards on all coasts give considerable local employment. In addition, they provide employment elsewhere. Every state contributes to the construction of a large ship, and many states contribute fabricated metal products. For example, machinery is supplied by 24 states, structural iron and steel by 12, metal fixtures, fittings and valves by 9, electrical equipment by 4 and hardware and tools by 7.

Thus shipyards are a potent source for normal or relief employment. Once contracts are let, the sub-contracts for outside materials and equipment are ordinarily place in two to twelve weeks. As a relief program having merit, the building of a 24,800 ton ship as now being constructed for the Atlantic trade by the United States Lines presents the following picture: cost, $15,750,000; labor in shipyards (40 per cent of cost), $6,300,000; purchased material, $7,875,000; outside labor's share (75 per cent of material cost), $5,900,000. Therefore the total expenditure for labor is $12,200,000. At a rate of 84.3 cents per hour, the average paid to shipyard labor (source, *Monthly Labor Review*, May 1938), a $15,750,000 ship aords 14,471,000 man-hours of employment. The attractiveness of shipbuilding as a relief program affecting all parts of the country has a distinct appeal. And something concrete is to be gotten for the money.

R.F.C. Loans Thirteen Millions to Industry

WASHINGTON — Industrial loans made by the Reconstruction Finance Corporation turned sharply upward in May. Loans and participations authorized during the month aggregated $13,091,802.59. This compares with $7,103,515 in April. The number of applications for industrial loans received during May was 817. This compares with 231 during April.

One of the larger May loans was to the Wilson Foundry and Machine Co., Pontiac, Mich. It was for $350,000. A $200,000 loan was approved for Graham-Paige Motors Corp. of Detroit. A loan of $25,000 was made to the Buhr Machine Tool Co. of Ann Arbor, Mich. and a $13,000 loan to the Hydraulic Devices, Inc., of Detroit. The RFC agreed to participate with the Webb City Bank in a loan of $15,000 for the Webb City and Carterville Foundry & Machine Works, Webb City, Mo.

U. S. Government Contracts Awarded to Metal-Working Firms

(Awarded from June 24–30 inclusive)

Contractor	Govt. Agency	Commodity	Amount
Struthers Wells-Titusville Corp.	War, Ordnance	Breech ring forgings	$79,100
Norris Stamping & Mfg. Co.	Navy, S & A	Ammunition boxes	264,894
Roth Office Equipment Co.	War, Air Corps	Cabinets	21,681
Surface Combustion Corp.	Navy, S & A	Furnace	161,655
Mine Safety Appliances Co.	Navy, S & A	Tools	53,584
The Crosby Co.	War, Signal Corps	Reels	11,825
Landis Tool Co.	War, QMC	Grinders	29,144
R. G. Le Tourneau, Inc.	Resettlement Admn.	Scrapers	17,340
Intertype Corp.	Govt. Prtg. Office	Slug casting machines	79,305
Hyde Windlass Co.	Navy, S & A	Gears	461,646
Allen Sherman Hoff Co.	TVA	Slag granulating & transporting equip.	39,171
Curtis Mfg. Co.	War, QMC	Car washers	14,922
R-S Products Corp.	Navy, S & A	Elec. furnaces & parts	10,360
Scintilla Magneto Co.	Phila. Navy Yard	Magneto parts & tools	101,900
Westinghouse Elec. & Mfg. Co.	Navy, S & A	Welding machines	31,320
Eclipse Aviation Corp.	Phila. Navy Yard	Starter parts & tools	159,971
Douglas Aircraft Co.	Navy, S & A	Airplane parts	40,907
International Harvester Co.	Post Office	Motor trucks	403,875
International Harvester Co.	Resettlement Admn.	Trucks	14,022
Autocar Sales & Service Co.	War, Engineer	Trucks	33,948
White Motor Co.	War, Engineer	Trucks	22,760

Big Japanese Orders Are Still Held Up

NEW YORK—After quite a delay, Japan resumed gold shipments to this country by sending $6,000,000. Maybe some of it will be earmarked for those large machine tool orders that have been pending here for some time. Dealers were hopeful that the dam would break a fortnight ago. Now they put the good news off for another two weeks.

By that time the visiting Japanese Army commission is expected to make up its mind, and place business worth less than a million. Of course, the exact amount and the kinds of equipment to be bought are closely guarded secrets. Nevertheless, it can be said on good authority that the list will include milling machines, grinders, boring machines, turret lathes and shapers.

In other respects, the Japanese business is classed as "insignificant" by one observer. He surmises that about half a million a month is the total for all the dealers in this town. Such an amount isn't insignificant in light of the way the index of the National Machine Tool Builders Association is sliding down hill, but it is disappointing when one remembers the several millions per month that were spent by the Japanese only a short time ago. The key to the situation is whether exchange permits will soon be granted on a freer basis.

Slackness continues in export orders for new machine tools, except from a few countries in Latin America. Colombia is still the best purchaser, followed in order by Peru, Venezuela, and Chile. A decided pickup is expected in Mexico when the exchange rate becomes more favorable to its nationals. A rate of four pesos to the dollar would do the trick. Cuba is slow and Argentina is quiet, but some improvement is expected there in the next two months.

Much used equipment is moving to South America, the Far East and even Europe. Prices approaching normal were obtained on South American deals, because German competition "missed the boat." The Japanese have been buying heavy equipment for railway shops, and their antagonists—the Chinese—are doing likewise. It is said that an inquiry for a large number of general-purpose machine tools will soon be forthcoming from China. She has commissions in this country and seems to have no difficulty in paying for what her inspectors pass.

Mass production equipment, such as used automatic millers and profilers, has been bought for English shops, presumably for armament purposes. Holland has bought large forging presses for a bolt and nut factory being set up there.

Exports of Machinery During May, 1938

	May 1938	April 1938	May 1937
Electrical machinery	$8,552,312	$9,358,648	$10,372,561
Power generating machinery except automotive and electric	1,573,948	1,313,673	1,119,505
Construction and conveying machinery	1,995,429	2,289,740	2,138,440
Mining, well and pumping machinery	5,680,304	6,039,529	5,429,705
Power driven, metal-working machinery	9,078,953	7,861,515	5,044,632
Other metal-working machinery	371,695	505,230	380,582
Textile machinery	491,856	1,217,254	738,091

Exports of Metal-Working Machinery During May, 1938

	May 1938	April 1938	May 1937
Engine lathes	$710,065	$339,397	$297,634
Turret lathes	407,699	937,923	297,802
Other lathes	209,121	47,988	122,465
Vertical boring mills and chucking machines	594,354	409,056	195,843
Thread cutting and automatic screw machines	422,314	496,864	309,802
Knee and column type milling machines	802,895	511,266	325,522
Other milling machines	591,101	560,039	193,129
Gear-cutting machines	313,078	303,732	234,843
Vertical drilling machines	96,031	139,679	65,994
Radial drilling machines	60,542	93,643	39,630
Other drilling machines	261,285	115,372	114,045
Planers and shapers	270,774	148,534	188,193
Surface grinding machines	218,360	328,982	130,466
External cylindrical grinding machines	378,183	401,843	238,488
Internal grinding machines	425,226	446,112	168,356
Tool grinding, cutter grinding and universal grinding machines	$285,429	$309,671	$185,458
Other metal-grinding machines and parts	342,771	230,076	75,411
Sheet and plate metal-working machines and parts	694,228	572,207	284,933
Forging machinery and parts	303,114	342,942	174,571
Rolling mill machinery and parts	549,104	304,369	710,222
Foundry and molding equipment and parts	192,051	149,909	133,974
Other power-driven metal-working machinery and parts	951,228	671,911	557,851

Other Metal-Working Machinery

	May 1938	April 1938	May 1937
Pneumatic portable tools	124,009	254,269	137,578
Portable and hand and foot operated metal-working machines and parts	107,902	119,852	105,505
Chucks for machine tools	19,323	22,388	18,119
Milling cutters, machinery operated threading dies and taps and similar machine operated metal cutting tools	79,500	46,716	61,192
Other metal-working machine tools	40,961	61,905	58,188

DETROIT LETTER

1938 car output likely to be considerably above two million units . . . June sales did not decline to extent anticipated . . . Used car sales this year may be off only 15 per cent from last year . . . Car makers and parts plants must buy steel soon

BURNHAM FINNEY
Editor, American Machinist

DETROIT—Though the automotive industry doesn't expect to break any records in the final half of the year, the hope is now aroused that things will be better than was predicted a few months ago. Sales executives privately are saying that 1938 will close with production considerably above the two million mark. Only a few weeks ago car makers were wondering whether they could reach that mark this year.

The more optimistic sentiment now prevailing is based more on intangible factors than on anything definite. President Paul Hoffman of Studebaker has stepped forth with the prediction that one million cars will be sold at retail this fall. A used car expert has gone so far as to state publicly that used car sales this year probably won't be off more than 15% from last year. If his statement is borne out, that is a remarkable record for used car dealers to roll up in a depression year.

Better Than Expected

In examining the reasons for the more cheerful spirit in Detroit one should not ignore the stimulating influence of the stock market's recent spectacular turn upward. Apart from that factor, however, retail sales in June didn't decline to the extent that the industry had anticipated. Packard, for example, reports that last month's retail deliveries were 20 per cent above the company's early estimates. Packard's highest-price line sold in the biggest volume in June since the '38 models were introduced last September. General Motors' sales to domestic consumers were 76,071 units, compared with 92,593 units in May. That's nothing to brag about, but again it is better than was hoped for.

While they believe that the country may be on the verge of coming out of its blue funk, hard-headed realists in the industry don't look for automobile makers to lead the van out of this depression as they did out of the last. They have a plausible explanation for their attitude. When the industry began to go places back in 1935, it had gone through four lean years, two of which were close to a starvation level. A tremendous backlog of retail demand had been stored up. The result was the lofty records established in 1936 and 1937. Today the industry is only seven months removed from a five-million-car year, a year in which retail sales were far in excess of normal replacement needs. It will take a couple of mediocre, if not bad years to put the industry in the same situation that existed prior to the last upward sweep.

The realists don't think that their attitude necessarily implies that they are bearish on the outlook. They expect a gradual rise in sales and output in the next 12 months. Incidentally, they feel that pump-priming is bound to cause some additional automotive buying for a time. They merely want to register the fact that they have their feet on the ground and aren't dreaming about dynamic Detroit again leading the country's charge up Recovery Hill.

Plant closings for retooling will be staggered this summer with most of the industry down during the latter part of August. Manufacture of new models will get under way in September or by October 1 at the latest. The consensus of opinion is that the recent drastic cuts in steel prices will be a major factor in reducing prices on 1939 models. Car makers have little steel on hand and car parts companies even less. That means some steel buying will be in order shortly. The rumor is that one well-known car will spring a surprise by having a hydraulic clutch on its '39 line. Truck sales have held up better this year than passenger car sales.

Pontiac uses about 150 cutters on its Gleasons that generate the rear axle gears. Of necessity, a battery of cutter grinders must be kept busy in sharpening cutters to such limits as 0.000025 in. Each grinder handles between 35 and 45 cutters per day

WATCHING WASHINGTON

Faults of the wage-hour law now worry sponsors . . . Its administration seems beyond human capacity, but the President isn't worried and wants to lift the South by its boot straps . . . Speedier Navy ships will cost more per ton, give many more jobs

McGRAW-HILL WASHINGTON BUREAU
(*Paul Wooton, Chief*)

WASHINGTON—A changed tone is noted in those who talked the wage-hour bill into the law books. During the long debate they contended stoutly it would raise living standards and increase demand for consumer goods, thereby helping everybody. But now that they've sold it, they discuss its faults. Actually they were convinced only that labor standards was something that ought to be tried for better or worse. Some few, including the President and other strong reformers, thought such a law would be the realization of their hopes.

One problem ahead is the gigantic task of administration. At hearings many men argued that the proposed board of five, with the help of industrial committees, could never do the job. Now the law says that one administrator shall do it. There are several hundred industries eligible to have wage-hour committees. How this executive is going to study and pass on all their reports in less than a lifetime, no one attempts to say.

The administration can, of course, pick out a few bad spots and go to work on them. In fact, labor students testified that a raise in pay for the relatively small groups of sweated and exploited workers would be about all the country could digest at first. Such advice now seems more true than ever.

South Is No. 1 Problem

Washington suspected the government would apply the law to the textile industries as soon as possible. Several good reasons make it appear this will be done. Scattered as it is, control of the textile industry would be quite a job alone. But observers say that one and two or three others could be handled in a year or two.

However, the President shows no signs of letting it go at that. Now, as he calls the South the nation's number one economic problem and demands that something be done about it, Washington harks back to his Gainesville speech in which he said the same thing, not quite so loud. Evidently he is determined to hoist the South to a higher living standard with higher wages and with remedies for other ills listed at length by his National Emergency Council diagnosticians.

If Southern economics are to be redesigned, that's a whale of a job. And from the point of view of the wage-hour law it involves a cross-section of American industry. Scores of committees, for all the industries that reach into the South, would have to make their studies and reports and the harried administrator would have to coordinate them into a logical and workable pattern in relation to the North. It seems almost beyond the scope of human capacity. But Mr. Roosevelt is not one to falter at that.

The law takes effect October 24. All except exempt employers go under the 25-cent provision at once with a 30-cent minimum the second year. Too many employers forget that the administrator, upon the recommendation of a committee, can slap the 40-cent minimum on at any time. Inevitably the law will be challenged in the courts. Some observers here say the New Deal half-way expects an adverse decision which it will use as a campaign issue. But the more prevalent opinion is that, though the Supreme Court's NRA annulment was unanimous, it's now a "reformed" judiciary which will not stand in the way.

Educational Orders

Ordnance and mobilization executives are working on plans to place educational orders some time this summer. Two million dollars is available from regular War Department funds for this purpose. Bids will be called for on certain special munitions, but the law permits almost complete departure from accepted bidding practice. Bids may be rejected in the interests of national defense, and orders may be negotiated without regard to prices quoted. Officials hint that only firms of proved ability will have a chance.

Speed for the Navy

Speed threatens to compete with tonnage and heavy calibre guns as a new yardstick to measure superiority in naval warfare. Navy men say the President is going to look for speed when he reviews the fleet off California. Speed will be a more important consideration in planning the billion dollar increase. The result will be higher cost per ton and bigger jobs for the metal-working industry.

British Trade Agreement

The State Department is going to drop the United Kingdom trade agreement on the manufacturer's desk while he is drowsing in August weather or loafing on vacation. Even if he doesn't like it, he probably will not bestir himself to protest to his Congressmen. A good many manufacturers are heavy exporters, and they will like the agreement.

MORE UPLIFT

President Roosevelt is still concentrating on reform. He is convinced by the recent stock market flurry that the New Deal has not destroyed the hope for profit incident to the capitalistic system, and is determined to push on, when Congress reconvenes, with his plans for uplifting the underprivileged. He expects to concentrate on the South, thinking that in this great section lies the largest market for Northern machinery and other products that can be developed by boosting individual buying power. To the great annoyance of many Southerners, part of this plan is to end the wage discrimination against negroes.

Anticipation of increased exports of machinery and all sorts of manufactured products to South America, especially to Brazil, is high in Washington, despite German and Italian propaganda. Removal of exchange restrictions by Brazil is one of the hopeful signs. This is true despite the fact that Brazil seems determined to become a competitor of the U.S. on corn now that she has succeeded so well as a cotton exporting country.

CALVIN VERITY

W. W. SEBALD

HARRY E. MILLER

PERSONALS

CALVIN VERITY has been elected executive vice-president and general manager, and W. W. SEBALD, vice-president and assistant general manager of the American Rolling Mill Co., according to an announcement by CHARLES R. HOOK, president.

HARRY E. MILLER, consulting manufacturing engineer, and former manager of the Newark meter works, Westinghouse Electric & Mfg. Co., retired June 30. He occupied executive positions with Westinghouse for 38 years.

F. W. MCINTYRE, vice-president and general manager of the Reed-Prentice Corp., Worcester, Mass., sailed July 6 for an extended trip to England and France.

E. M. HICOK, industrial relations and accounting head, Point Breeze, Md., works, Western Electric Co., succeeds G. A. PENNOCK as manager of the apparatus and cable division, Hawthorne works, Chicago. Mr. Pennock resigned to accept a position as manufacturing supervisor, International Telephone & Telegraph Co., London.

Mr. Hicok was production superintendent at Hawthorne before being transferred to Point Breeze in 1929. He has been with the company since 1905.

Mr. Pennock was secretary, Kansas City Bolt & Nut Co., in 1900 and 1901. He was chief draftsman, Webber Gas & Gasoline Engine Co. of Kansas, from 1901 to 1903. From there he went to Rock Island Plow Co. as mechanical superintendent which position he held until 1906 when he joined Western Electric as factory engineer.

Jones & Laughlin Steel Corp., Pittsburgh, has completed a modern wire rope plant at Muncy, Lycoming County, Pa., as an additional unit of its expansion and development program. This plant, to be known as the Gilmore Wire Rope Division, marks entry by the corporation into a new line of finished parts including wire rope for oil country use, general construction purposes and industrial applications. Fabrication and sale of the products of the new plant are under the direction and supervision of ROBERT GILMORE, general manager.

EDWIN L. LARSON, connected with the engineering department of the Van Norman Machine Tool Co., Springfield, Mass., has been appointed assistant sales manager. Mr. Larson was at one time chief engineer of the Bausch Machine Tool Co.

A. L. PETERSEN has been made manager of the St. Louis plant of the Joseph T. Ryerson & Son, Inc. He has been with the Ryerson Company for 25 years, and for some time has been assistant manager. R. B. WILSON will continue as special sales representative.

COL. FRED GLOVER of Detroit, has been elected president of the Reo Motor Car Co., to succeed DONALD E. BATES, who resigned as president and general manager. In 1923 Col. Glover was made president of the Timken Detroit Axle Company, and retired about ten years later.

C. V. MCKAIG, vice-president in charge of sales, United States Steel Corp. of Delaware, Pittsburgh, Pa., has been elected a member of the board of directors of the American Iron & Steel Institute.

O. W. MACY, formerly sales engineer, has been named sales manager, The Logansport Machine Co., manufacturers of "Logan" air and hydraulic devices, Logansport, Indiana.

ROBERT LEMUEL SACKETT, dean of the school of engineering, Pennsylvania State College, from 1915-1937, was awarded the Lamme Medal of the Society for the Promotion of Engineering Education. Since retirement, Dean Sackett has devoted himself largely to the work of the Engineering Council for Professional Development.

R. G. WYLD has been appointed vice-president in charge of engineering for Airtemp, Inc., the air-conditioning subsidiary of the Chrysler Corp. He was formerly executive engineer.

R. E. TAYLOR has been appointed sales research manager by the Norton Co. He succeeds MILTON P. HIGGINS, transferred to the Chippawa plant.

E. M. HICOK

G. A. PENNOCK

R. G. WYLD

ROBERT GILMORE

A. L. PETERSEN

O. W. MACY

GEORGE E. EMMONS

EDWARD O. GOSS

HARRY H. WETZEL

OBITUARIES

GEORGE E. EMMONS, 80, formerly manager of the Schenectady Works of the General Electric Co., and later vice-president in charge of manufacturing for the company, died in Pasadena, Calif., July 1. Mr. Emmons devoted more than a quarter century directing the development of one of the world's largest electrical plants as general manager of the Schenectady works.

In 1893 Mr. Emmons was appointed manager of the Lynn works of the General Electric Company, and in 1894 was transferred to Schenectady as assistant manager of the Schenectady works. A year later he was appointed manager, and held that position for 25 years. In 1913 Mr. Emmons was appointed chairman of the manufacturing committee of the company, and in 1916 he became vice-president, in charge of manufacturing, continuing in this capacity until his retirement in 1924.

EDWARD OTIS GOSS, president of the Scovill Mfg. Co., Waterbury, Conn., died July 4 at the age of 72. He started with Scovill in 1888 as a draftsman and became president in 1920. Under his direction the concern expanded greatly, but was able to pay dividends throughout the depression.

THEODORE FRIEDEBERG, former president of the Manhattan Machinery Exchange, New York, and active in the used machinery business since 1905, died July 5, at the age of 65. He acted as a liquidator and reorganizer of manufacturing plants, among which were the old Lozier Motor Co., S. G. V. Co. of Newark, Willys St. Clair Motor Co., Bath Iron Works and the Merchants Metals Co.

HARRY A. DUFFY, for years purchasing agent for the Ford Motor Co. at the Highland Park plant, and recently purchasing agent for the Michigan Tool Co., died June 29.

CARL G. DALQUIST, sales manager, Swartz Tool Products Co., Detroit, died June 25 at the age of 43. He was formerly with Graham-Paige Motors Corp. and George A. Gloor Co.

CHARLES J. ANDERSON, president of the Woodworking Machine Co., Buffalo, died recently at the age of 63.

HARRY H. WETZEL, vice-president and general manager of the Douglas Aircraft Corp., Santa Monica, Calif., died July 5, after an emergency operation. His age was 49. During the 16 years that Mr. Wetzel was vice-president and general manager of Douglas, the plant attained its present size under his direction. Only the previous week the War Department had placed the largest peace-time order for planes and equipment, and a contract worth $5,703,287 went to Douglas.

FREDERICK H. TWEED, general manager and treasurer since 1906, Dole Valve Co., Chicago, died June 22 at the age of 73.

JOHN HENRY SUTHERLAND, Swampscott, Mass., retired and formerly president of J. H. Sutherland & Co., Lynn, manufacturers of shoe patterns machinery, died July 6, aged 70 years.

FRANK J. MCMURDIE, 75, superintendent and engineer of the Claridge Fan Co., Kalamazoo, Mich., died suddenly of a heart attack July 3 while seated in his parked automobile in Washington, D. C.

THOMAS J. SMITH, 64, vice-president of the Cleveland Steel Products Co., Cleveland, Ohio, died July 5 after an illness of two years. He came to Cleveland from New York in 1900.

BUSINESS ITEMS

Safway Steel Scaffolds Co., Milwaukee, announces the establishment of a subsidiary, Safway Steel Scaffolds Co. of California, and plans to open a new factory and office in San Francisco with JOHN F. RONEY as president of the new company.

The Watson-Stillman Co. announces that a contract has been made with Duncan Stewart & Co., Ltd., of Glasgow, covering the manufacture for the English market of Watson-Stillman hydraulic horizontal extrusion presses, high speed metal forming presses, powder presses, ingot strippers, and other equipment. In turn, the Watson-Stillman Co. will manufacture for the American market the Duncan Stewart high-speed steam hydraulic forging presses, vertical rod and tube extrusion presses, air bottle accumulators and similar equipment.

The Van Norman Machine Tool Co., Springfield, Mass., has purchased the machine tool business of the Producto Machine Co., Bridgeport, Conn. The sale was consummated on June 8 and an addition has been started to the main Van Norman plant to house the manufacture of Producto machines. Included in the Producto-matic line are crankshaft mills, cam-type millers, heavy production mills, bed-type manufacturing mills, as well as smaller knee-type manufacturing machines.

Producto Machine Co. will continue the manufacture of die sets and grey iron castings, and will also service the older type machines previously manufactured by that concern.

The Blanchard Machine Co., 64 State St., Cambridge, Mass., has announced that its office and shop will be closed for the annual vacation from July 17–31 inclusive. Stock parts and grinding wheels will be shipped if urgently required during the vacation period. Orders that are not urgent will be shipped after the reopening on August 1.

The directors of the Simonds Saw & Steel Co. have decided to proceed at once to move into its new windowless plant at Fitchburg, Mass. The company built this plant in 1931 but did not attempt to move into it then on account of severe business depression.

The new plant will be the largest and most modern saw and knife plant in the world and will contain the main Fitchburg saw and knife plant, the Fitchburg file and hack saw plant and also the Chicago plant where band saws and crosscut saws are manufactured. Moving and installation of machinery will require from eight to twelve months.

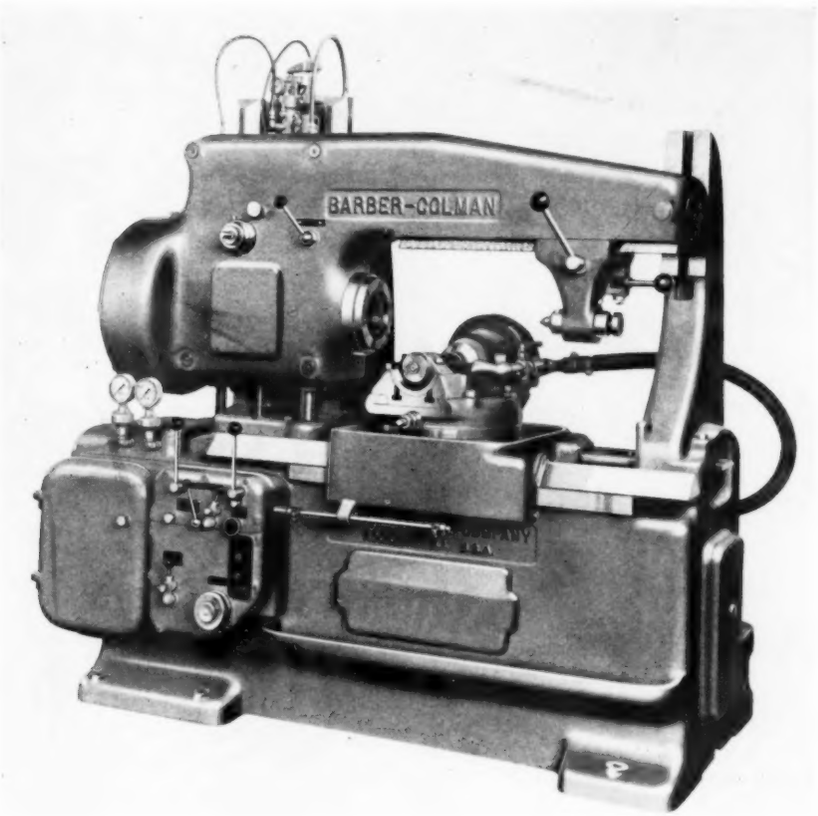
Sterling Pump Corp., with factories at Stockton, Calif., and South Bend, Ind., has been acquired by new interests. MAURICE ROTHSCHILD of Chicago was elected president. New officers are D. S. WALLACE, vice-president and general manager; EVERETT LUNDY, vice-president of the western division; FREDERICK S. JONES, vice-president of the eastern division; B. W. HEINEMAN, secretary. Mr. Rothschild, Mr. Wallace, J. E. BIERWITH and CHARLES A. ANDRES are the directors.

The Lewis-Shepard Sales Corp., Watertown, Mass., has appointed the following representatives to handle its line of lift trucks, portable elevators, floor trucks, skid platforms and other materials handling equipment: Wesley D. Low, P. O. Box 1124, Knoxville, Tenn.; Industrial Supply Co., 121–131 Motor Ave., Salt Lake City, Utah, and J. W. Ralston Co., 1522—4th Ave. South, Seattle, Wash.

The Hill Clutch Machine & Foundry Co., formerly located at 44 Main St., Orange, N. J., has reestablished its New York address at 90 West St. The office will continue to operate as the Eastern Branch for power transmission and agitator sales, and ARTHUR L. WHITESIDE will be in charge.

The General Time Service, 1507 W. Vliet St., Milwaukee has been organized to repair and recondition time equipment requiring the fabrication of obsolete parts, wheels, pinions and particularly for manufacturers' discontinued models.

SHOP EQUIPMENT NEWS



Barber-Colman Type D Hydraulic Hobber

Hydraulic equipment built into the Type D hobbing machine announced by Barber-Colman Co., River and Loomis St., Rockford, Ill., provides left-to-right climb cutting or conventional hobbing by simple manual adjustments on the control panel. Reversal of feed direction automatically makes a corresponding change of rapid traverse in the automatic cycle. Inching of the hob slide and hydraulic rapid traverse to right or left for setting up is controlled by corresponding manual movement of a lever which can be operated only when the work is clear of the hob. The improved bed houses the hydraulic power unit and electrical accessories and contains reservoirs for hydraulic oil and coolant.

Hydraulic feed of the hob is indicated by a large graduated dial and any feed rate from stand still to maximum can be established or changed at any time by adjusting the dial. Hob slide can be inched and spindle rotated continuously or jogged independently in disengagement from the automatic cycle for set-up. All movements are interlocked against conflicting operation. Depth of cut is established by contact of two hardened steel stops, one in positive fixed position, and the other having a micrometer adjustment.

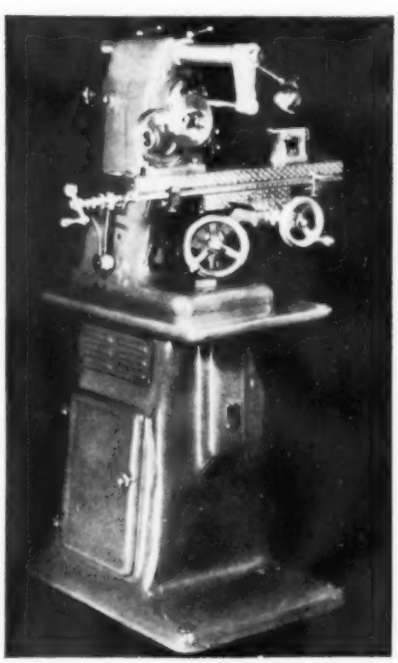
Direct-reading gauges indicate the clamping and feeding pressures in the hydraulic circuit and provide a continuous check on satisfactory operation. Hydraulic clamps lock the work slide overarm in position with equalized pressure at five points.

Specifications: capacity, maximum diameter, 14 in.; maximum face width, 14 in.; maximum diametral pitch in steel, 3; maximum travel of hob slide, 15 in.; maximum hob diameter, $5\frac{1}{2}$ in.; maximum hob length with straight spindle, 5 in.; maximum distance from center line of work spindle to center line of hob spindle, $9\frac{3}{4}$ in.; range of eight hob spindle speeds, 62–240 r.p.m.; maximum feed, 2 in. per min.; motor recommended, 10 hp.; length over all, doors open, $108\frac{1}{2}$ in.; with over-all, doors open, 59 in.; height, 75 in.; net weight, 9,500 lb.

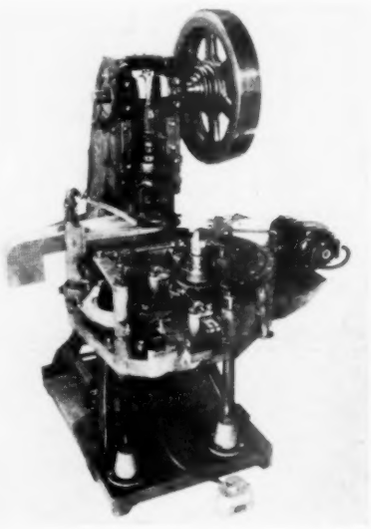
"Cataract" Model BB5 Milling Machine

Equipped with a pre-loaded ball bearing spindle, the Model BB5 "Cataract" precision milling machine announced by Hardinge Bros., Inc., Elmira, N. Y., incloses the complete driving unit in the heavy, well-ventilated base. If desired, the machine proper may be mounted on a 48 x 30 in. braced bench driving unit. Eight spindle speeds, either forward or reverse, range from 110 to 1,850 r.p.m. Base incloses a standard two-speed reversible motor which is connected by V-belt to a four step pulley.

Specifications: size of table, in-



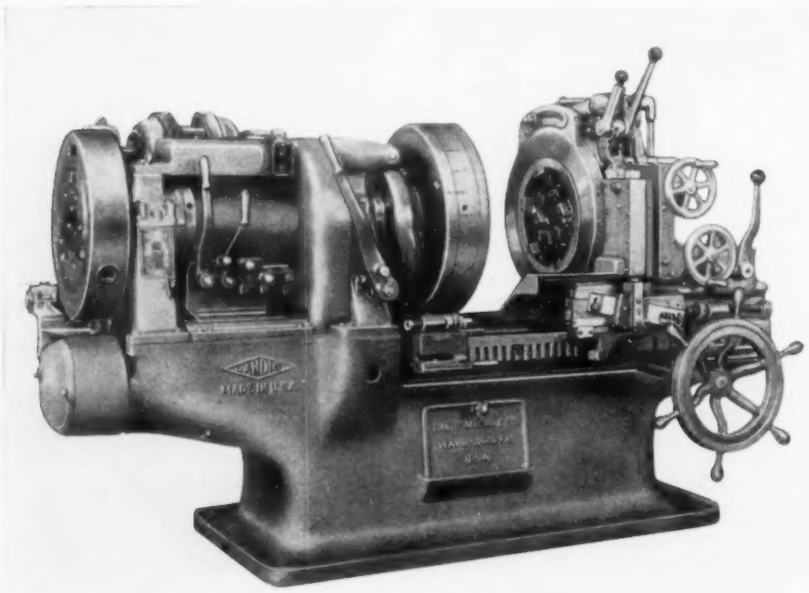
cluding oil pockets and channels, 24 x 6 in.; working surface of table, 20 x 6 in.; longitudinal travel of table, 13¾ in.; transverse travel of table, 6 in.; vertical adjustment of table, 7 in.; maximum distance from center of spindle to top of table, 7 in.; distance from center of spindle to underside of arbor support arm, 3¾ in., maximum distance from end of spindle to bronze bushing in arbor support, 10¼ in., capacity of spindle, 1 in. collet; floor space required, 45 x 43 in.



Landis 4¾-in. Receding-Chaser Pipe Threading and Cutting Machine

The 4¾-in. receding-chaser pipe threading and cutting machine announced by Landis Machine Co., Inc., Waynesboro, Pa., has capacity from 1⅝ to 4¾ in. outside diameter pipe. It will generate a tapered pipe thread of any length up to and including 5 in., and will cut all tapers regularly used for plain pipe, oil well casing, tubing and drill pipe on all sizes within its range. The die head used has a universal adjustment for size and, in addition, features a micrometer adjustment. The graduations on the micrometer adjustment are spaced to give a variation of 0.001 in. on diameter. This die head is arranged so that both the roughing and finishing cuts can be made without any diametrical adjustment of the die head.

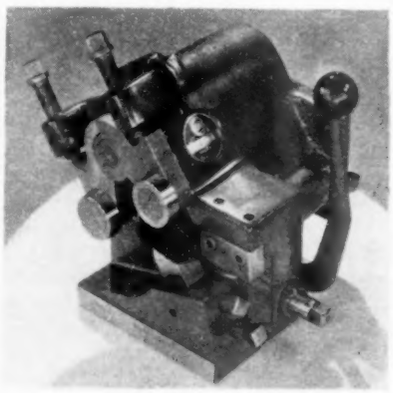
Taper is controlled by a sine-bar which is quickly adjusted for all tapers and is said to assure uniform taper throughout the length of the thread. Forward travel of the die head onto the work is controlled by means of a lead screw. This lead screw is located between the guides of the machine and has a coarse pitch thread with a rounded crest to facilitate the engagement of the nut and to insure maximum life. When one end of the lead screw becomes worn through use to the extent that the lead is not properly controlled, it can be reversed in its position to permit the use of the opposite end. A pitch indicator is provided to assist the operator in correctly engaging the leadscrew nut where a second, or finishing cut is to be made. A self-contained coolant system supplies coolant directly to each chaser.



Heyman Pneumatic Semi-Automatic Feeder

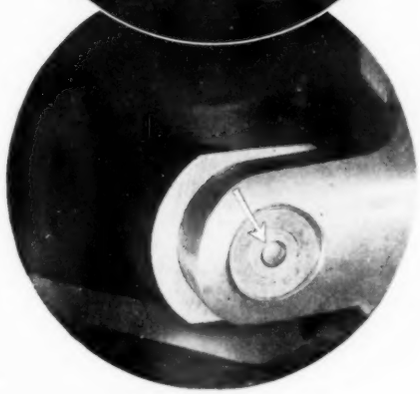
A semi-automatic feeding unit, designed for mounting on a punch press, has been developed by Hyman Mfg. Co., 149 Church St., New York, N. Y., for feeding irregularly shaped pieces of mica to blanking dies. Essentially, the unit consists of an indexing table with multiple dies, intermittently rotated by a pawl and ratchet. The material to be punched is held on the table by means of vacuum which is broken when a piece of material comes diametrically opposite the die. At this point, the left arm picks up a piece of material by means of a vacuum and lays it down on the die. This is done accurately, so that a piece almost exactly the size of the die can be used.

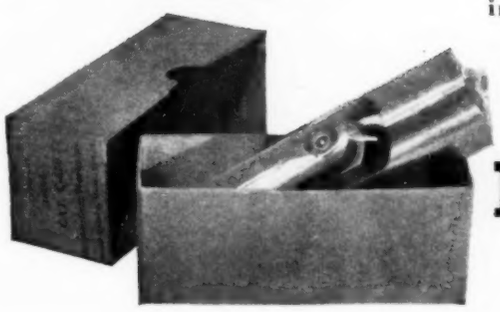
Operator sits away from the press at the side of the machine and lays down the piece of the material on a form which is the same as the piece to be cut by the die. By placing the piece on the pattern, the operator can see at a glance whether the piece is suitable or not and, by throwing the poor piece away from the table, she can keep the operation going continuously. A single rotary compressor provides air at 25 lb. per sq. in. for blowing the waste and finished products into the proper chutes. Suction line of this compressor is attached to a header which supplies the vacuum for the feeding unit.



Gisholt Single-Cutter Improved Bar Turner

A single-cutter bar turner for use on No. 3, 4, and 5 ram-type universal turret lathes and No. 1L, 2L and 3L high-production turret lathes has been announced by Gisholt Machine Co., Madison, Wis. This improved turner is claimed to meet the need





NEW AND INTERESTING FEATURES OF BOSTON GEAR UNIVERSAL JOINTS

First, you can now get Boston Gear Universal Joints immediately from stock bored or solid, as you wish. The holes in the bored joints range from 3/16″ to 2″ in diameter and the hubs of either the bored or the solid joints range from ⅜″ to 4″ in diameter.

Second, the pivot pins of all universal joints having hub diameters of ⅞″ and larger are locked into position by the telltale lock ring shown in the illustration at the left. After assembly, if lock ring appears as shown, you know that the pivot pins have been securely locked into their proper position. The pivot pins of joints with hub diameters of ¾″ and smaller are riveted into position.

Third, Curtis type joints with hub diameters of 1″ and larger, have a patented ball oiling device in one end of the large pivot pin as shown in the illustration at the left. Boston Gear offers you the choice of two types of universal joints: (1) the Curtis type, which, in sizes of 1″ hub diameter and over contains the patented ball oiling device, and (2) the Taylor type, of the same design as the Curtis, except that the patented oiling device is omitted.

Fourth, to insure you're getting joints that have not been injured by dirt or moisture, each is cellophane wrapped and individually boxed.

Pages 256 to 259 of your copy of our general catalog No. 52 contain complete specifications and list prices of these joints. If you haven't as yet received your copy, just tell us and we will be glad to send you as many as you can use.

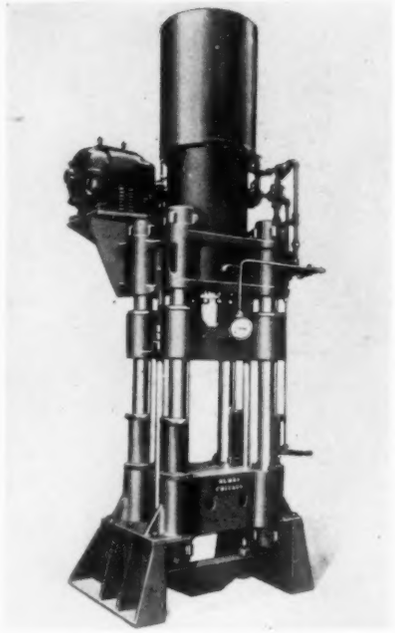
BOSTON GEAR WORKS, INC.

NORTH QUINCY, MASSACHUSETTS

for a rigid turner that will take high speed cuts, maintain accurate dimensions and fine finish and one that may be set up quickly for turning different diameters. A graduated micrometer screw facilitates cutting to exact diameters after the tools have been set to center. The roller bracket is a single assembly with the rollers held against the adjusting screws by spring tension. Rollers can be adjusted to lead or follow the cutter. The operating lever retracts the cutting tool 1/32 in. from the work to prevent marring when backing off the turner.

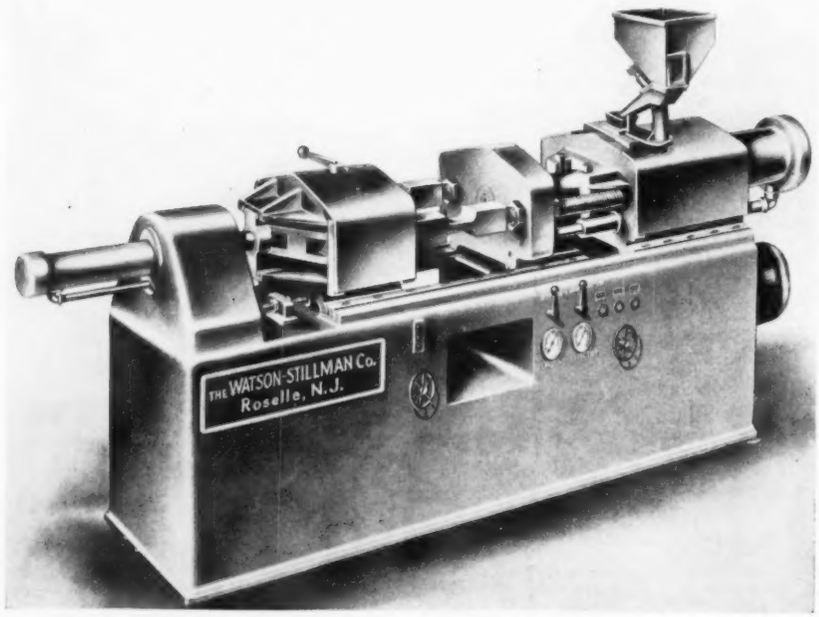
Elmes 350-Ton Metal Forming Press

A single lever operates the 350-ton hydraulic metal-forming press recently announced by Charles F. Elmes Engineering Works, Morgan and Fulton St., Chicago, Ill. Ram movement is under instant control of the operator. Built in various sizes and capacities, this press provides a wide range of pressures for coining, blanking and forming operations. Moving



platen is equipped with long guides and is pressure lubricated. Platen stroke is adjustable up to 20 in. by movement of a rod located on the side of the press. Pushbutton control can be provided if desired.

"Wasco" No. 6 Hydraulic, Automatic Plastic Injection Molding Machine

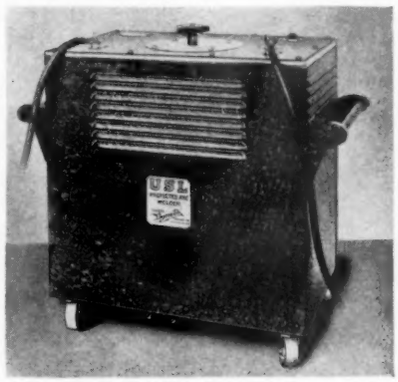


The Watson-Stillman Co., 75 West St., New York, N. Y., has developed the No. 6 "Wasco" hydraulic injection plastic molding machine for manual, semi-automatic, or full automatic operation. Having a 24-in. maximum opening between die plates and an adjustment of 18 in. on the clamping end, dies 6 in. thick and more can be accommodated. Dies having up to 50 sq. in. projected area are held closed by an improved clamping device without transmitting strain to the rest of the machine. Die plate can be moved forward, away from the nozzle, when it is necessary to clean the contact bushing.

Specifications: capacity of hopper, 25 lb.; capacity of hopper feed, 0–6 oz.; plunger stroke, 8 in.; speed of injection plunger, 180 in. per min.; maximum shot with 1¾ in. plunger, 3 oz.; maximum shot with 2 3/16 in. plunger, 6 oz.; working pressure, 1,000 lb. per sq. in.; timing device may be set for 1 to 6 cycles per min.; floor space required, 160 x 34 in.; motor required, 15 hp.

Owen-Dyneto "USL" Electric Arc Welder

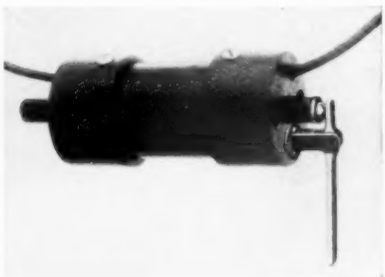
"USL" protected arc a.c. transformer type welders, announced by Owen-Dyneto Corp., Syracuse, N. Y., are rated at 150 amp. and have a range from 30 to 280 amp. output. Open



circuit voltage is 55 volts, maintaining 20–30 volts across the arc. Rods ranging from 1/16 to ¼ in. in diameter can be used. A single dial permits setting the machine to the requirements of the work and the use of jacks or plugs to secure change of current is avoided. Net weight of the unit is 190 lbs.

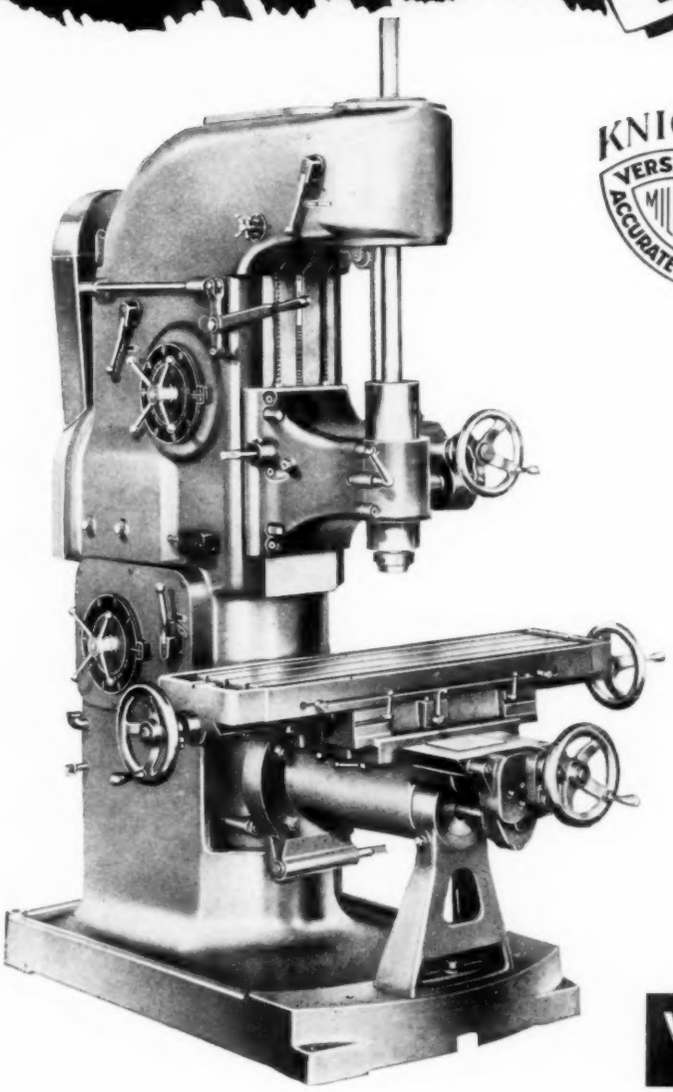
Hetherington "King" Contacts

Designed to be operated rapidly by an extremely light touch, the "King" contacts offered by Robert Hetherington and Son, Sharon Hill, Pa., require a movement of 1/64 in. to open or close the contact where pressure is



THE BOSS- "Our records show Profits more on jobs"

THE SUPER- JOB TICKET JOB TICKET JOB TICKET JOB TICKET "Well you can credit that to our new KNIGHT-MILLER"



KNIGHT VERSATILE MILLER ACCURATE-RIGID

Experience counts—and now with such experience, both the boss and the super have a reliable answer for increasing profits.

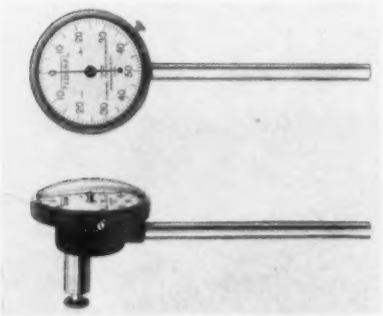
Why?—because with the new Knight Miller set-ups, even the difficult ones are quickly made and additional ones often eliminated; further much layout time is saved by using the dial indicator equipment and the tilting-swiveling table does away with the need of many special jigs—fixtures and tools.

There are other reasons why the Knight Miller produces better work, insures greater speed, and earns more profits—

Write for them!

W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

directly against the contact plunger. Standard contacts require a pressure of 5 oz., but special contacts can be furnished for lighter operating pressures. Where a lever pressure is used, the pressure required at the lever end is approximately 1½ oz. These contacts will handle safely 30 amp. at 110 volts, or 15 amp. at 220 volts a.c. Normally closed and normally open types are available.

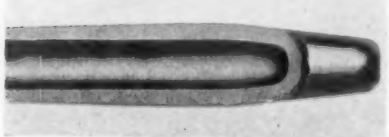


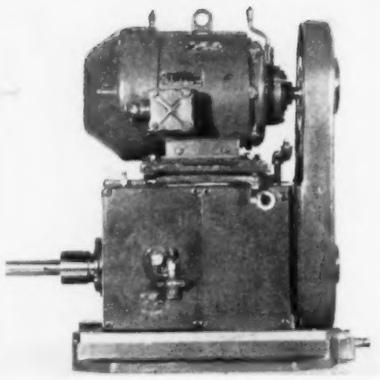
Federal Type V-8-I Dial Indicator

Graduated in 0.001 in. and having a range of 0.100 in., the Model V-8-I dial indicator announced by Federal Products Corp., 1144 Eddy St., Providence, R. I., is of the perpendicular spindle type. The contact point is perpendicular to the face of the dial, which is claimed to permit the indicator to be used in positions where the regular type of indicator is not readily adaptable. A crown gear is used to change the direction of the gear movement.

Mallory "New Type" Spot Welding Tips

P. R. Mallory & Co., 3027 E. Washington St., Indianapolis, Ind., has announced the development of "New Type" spot welding tips having pointed tips and tapered shanks. Bottom of the water hole in these tips is rounded to provide for smooth flow of the coolant. The tips are available in 0.463, 0.482 and 0.625 in. diameters, with lengths ranging from 1 to 4¼ in., in Elkaloy or Mallory 3 metal. In addition to this new welding tip, the Mallory Company has announced the completion of standardization of its line of spot-welding tips and water cooled tip holders.

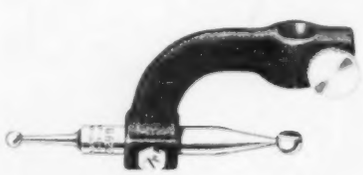




Kingsbury Automatic Drilling Units

Positive-feed automatic drilling and tapping units announced by Kingsbury Machine Tool Corp., Keene, N. H., are available in horizontal and vertical units with either belt or gear drive. These units are self-contained and may be used either singly or in groups for performing a multiplicity of machining operations. Although often used continuously in one set-up, construction features enable feeds, speeds, and lengths of stroke to be changed easily.

All gear driven units are powered by N.E.M.A. flange mounted motors, while belt driven units are powered by standard foot mounted motors. Models Nos. 12 and 13 have a maximum stroke of 2½ in. and are furnished with motors from 1 to 2 hp., according to requirements. Models 22 and 23 have a maximum stroke of 3½ in. and are equipped with 2 to 3 hp. motors. All tapping units have reversing motors. A tapping control assembly may be inserted in the drilling unit at any time. Multiple spindle heads may be mounted on the quill to meet the requirements of various jobs and milling attachments are available for special applications.

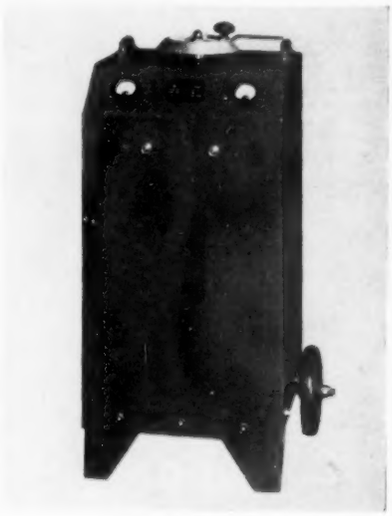


B. & S. Hole Attachment For Dial Indicators

Two hole attachments designed to increase the usefulness of dial test indicators have been announced by Brown & Sharpe Mfg. Co., Providence, R. I. These attachments adapt the indicator for testing internal and other surfaces which cannot be reached with the spindle of the dial gage. Attachment No. 729A is suited for use with deep holes to a depth of $1\frac{1}{16}$ in., while attachment No. 729B, shown, is suited for short, shallow holes or for rough grinding or boring operations. Having a short arm, the tendency to chatter is reduced with this attachment. It will enter to a depth of $\frac{13}{16}$ in.

G-R Model 35 Arc Welder

The Model 35 transformer-type a.c. arc welder announced by Glenn-Roberts Co., 1009 Fruitvale Ave., Oakland, Calif., is rated at 45 amp. for 240 volts and 22.5 amp. for 480



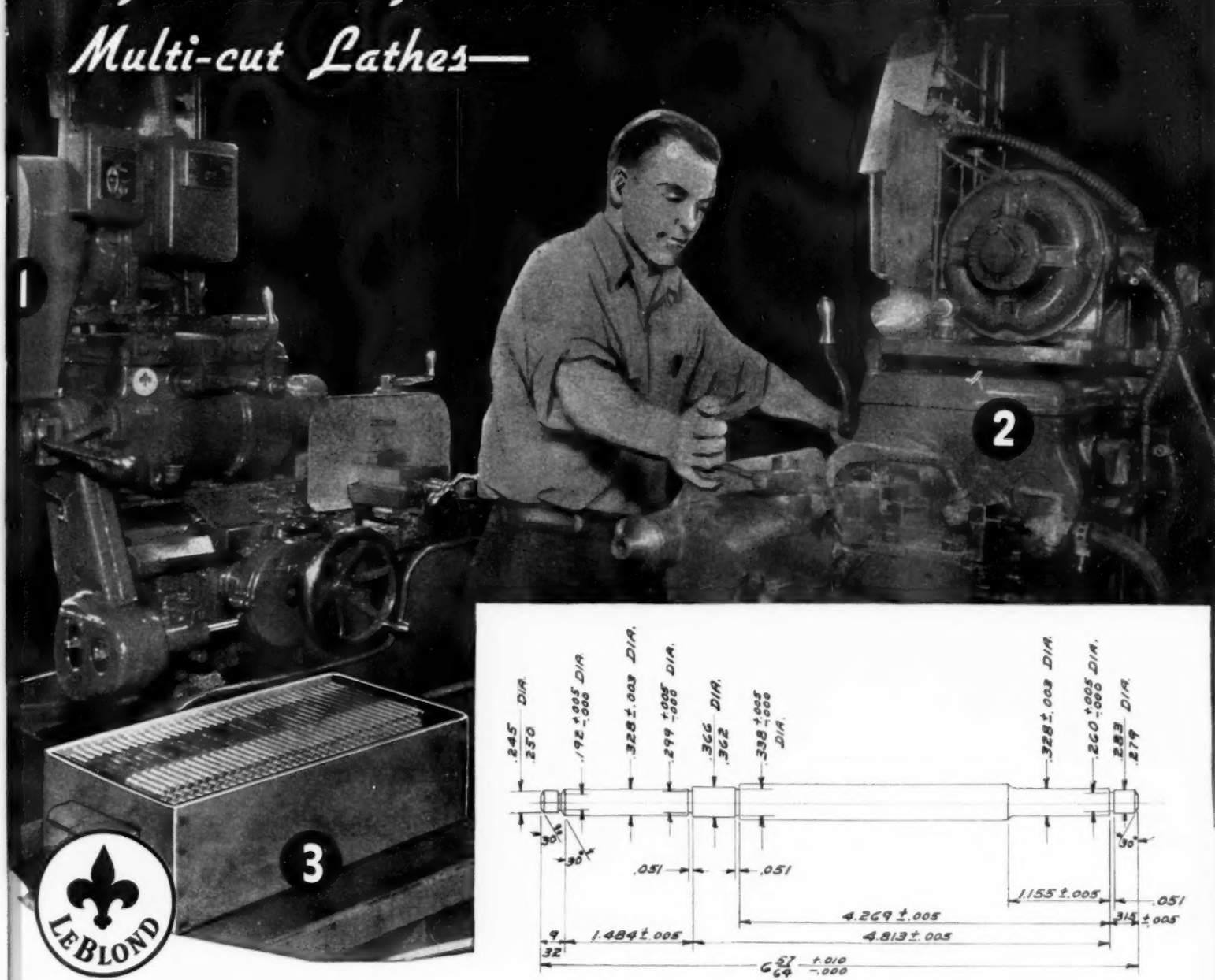
volts service. Output ranges from 20 to 275 amp. with 70 volts open circuit and 20-30 volts when welding. This model is 39 in. high, 18½ in. wide and 18 in. deep.

Another unit, the Model 25 welder, is rated at 30 amp. for 240 volts and 15 amp. for 480 volts service. This unit is 37½ in. high, 18½ in. wide and 18 in. deep.

Van Keuren Improved Light Wave Micrometer

Improved light wave pressure indicator provided with the light wave micrometer offered by The Van Keuren Co., 12 Copeland St., Watertown, Boston, Mass., is claimed to give permanent and easy adjustment without loss of sensitivity. These micrometers now are furnished with calibrated screws. The instrument consists of a precision micrometer head on which is mounted a 6-in. diameter aluminum wheel with

Turning 165 Motor Shafts an Hour with High Accuracy—Close Tolerance on LeBlond Multi-cut Lathes—



(1) On this 6" LeBlond Multi-Cut Lathe one end of the motor shaft is turned down and undercut in three dimensions to form A—Threaded end for nut; B—Diameter for fan hub; C—Diameter for large bearing.

(2) On this 6" LeBlond Multi-Cut Lathe the other end of the motor shaft is turned and undercut in two dimensions for A—Small bearing diameter; B—Commutator diameter.

(3) These two Lathes turn over 165 of these small motor shafts per hour—with high accuracy—low cost—and with remarkable ease of operation.

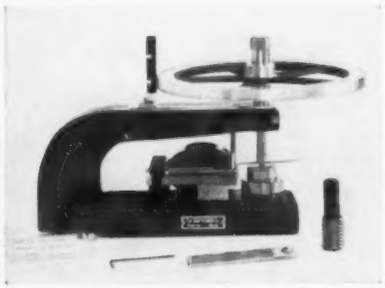
Two LeBlond Multi-Cut Lathes installed in the factory of Electrolux Inc., Old Greenwich, Conn., turn 165 small motor shafts an hour requiring the close tolerances shown in sketch above. The motor shafts are run true on their centers at all times. This method permits the use of minimum stock for grinding, and also eliminates the straightening operation necessary in some set-ups.

LeBlond Multi-Cut Lathes are designed and engineered to deliver high accuracy at high speed and at low cost.

Detailed information regarding LeBlond Multi-Cut Lathes is provided in Bulletins 12 MC 237-2 and 69 MCA 737. Write for your copy.

THE R. K. LEBLOND MACHINE TOOL CO.

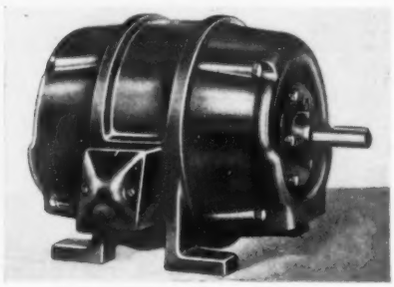
Dept. H-10 **CINCINNATI, OHIO**



0.0001 in. graduations, approximately 3/32 in. apart, permitting readings of 0.00001 in. to be estimated. The light wave-pressure indicator consists of an arrangement of a glass and a steel optical flat and a red selenium glass screen. Two sizes of this instrument are available, with 0-1 and 0-2 in. ranges.

Diehl Splash-Proof Electric Motors

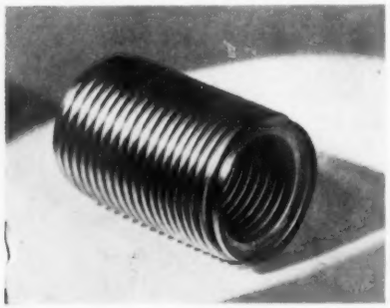
A line of splash-proof electric motors with specially impregnated windings has been announced by Diehl Mfg. Co., Elizabethport, N. J. These mo-



tors conform to N.E.M.A. specifications for splash-proof motors and they are furnished in all N.E.M.A. sizes and ratings.

C.M.H. Announces Stainless Steel Bellows

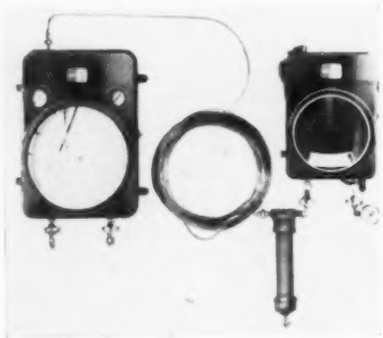
Suitable for all types of industrial applications, a line of stainless steel bellows, offered by Chicago Metal Hose Corp., Maywood, Ill., can be used for temperatures up to 11,000 F. without



detrimental effect. These bellows will deflect equal amounts for equal increments of weight or pressure. They are available in nine sizes, ranging from $\frac{3}{8}$ in. inside diameter, by $\frac{9}{16}$ in. outside diameter, up to $1\frac{5}{8}$ in. inside diameter by $2\frac{7}{16}$ in. outside diameter. Made in one piece from thin-walled stainless steel, these bellows are formed by seam-welding thin strip into tubing and rolling the tubular forms into the finished bellows. Available in undivided and divided forms, these bellows can be furnished with cup, rolled in, flush or extended necks.

Bristol Pneumatic "Metavane" System

The "Metavane" pneumatic telemetering system offered by The Bristol Co., Waterbury, Conn., for recording an automatically controlling temperature, flow, pressure and liquid level, is claimed to be particularly suited for use in plants where explosive fumes are present. Being operated entirely by air under pressure, this system consists of two instruments, a transmitter and a receiver. The transmitter measures the variable in question, and indicates its value on a scale for the use of the operator. Readings are transmitted to the receiver, which may be several hundred feet away. The two instruments are connected by copper tubing.



Pioneer Coolant Tank and Pump Units

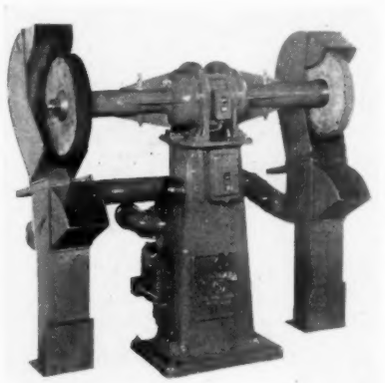
Pioneer Engineering and Mfg. Co., 31 Melbourne Ave., Detroit, Mich., has developed a series of self-contained coolant tank and pump units. These are designed to serve as complete individual or stand by units for supplying coolant to one or more machines. Five sizes are available, each having optional pumping characteristics, thus permitting wide application.

Pumps available with these units provide capacities from 1 to 80 gal.

per min. and pressures up to 23 lb. The covers of three of the models are arranged for use either with a chip basket or a bag filter. The chip basket is placed on the return side of the unit to serve as a collector for chips or other fine matter. Filter bag is recommended for use on grinding, honing or lapping machines where the chip basket will not serve to remove the foreign matter held in suspension by the liquid.

Standard Buffer Exhaust Equipment

Exhaust equipment suitable for mounting on pedestal type buffing and polishing machines in sizes from 1 to 20 hp. has been announced by The Standard Electrical Tool Co., 1940 W. Eighth St., Cincinnati, Ohio. Exhaust blower is powered by a 3,600 r.p.m. motor, the motor and blower being mounted on a common base and attached to the back of the pedestal of the machine. There is an air filtering stand available for use in connection with this blower.



Stackbin Heavy-Duty Industrial Box Truck

Made of two separate units, the industrial box truck announced by The Stackbin Corp., 54 Troy St., Providence, R. I., is designed to give high strength with a minimum of dead weight. The chassis unit consists of

BOLT THREADING? . . . HERE'S THE MACHINE FOR YOUR WORK

Salvaging rusted bolts in large railway shop.

The "RAPIDUCTION" Bolt Threader is designed and engineered from the base up to give you the best performance possible on a wide variety of work.

Built in two sizes, 3/8" to 1 1/2" and 1/2" to 2 1/4", in both single and double spindle models, the "RAPIDUCTION" handles not only standard jobs but, because vise and carriage are free from obstructions, is adaptable to the application of special fixtures for holding unusual jobs of many kinds.

Write today for complete information and specifications.

THE OSTER MANUFACTURING COMPANY

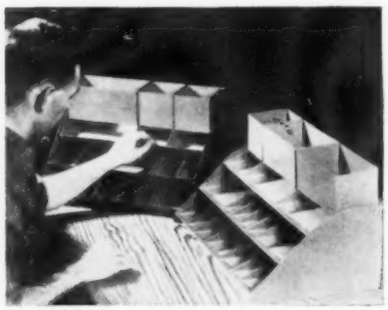
Sales office: 2049 East 61st Street, Cleveland, Ohio
Factories:—Erie, Penna., and Cleveland, Ohio
New York City Showroom and Office, 292 Lafayette St.
Philadelphia Showroom and Office, 111 No. 3rd St.
Threading Headquarters Since 1893

OSTER
THREADING EQUIPMENT
WILLIAMS

a heavy channel frame to which are bolted four casters. Body unit is built up of No. 15 gage sheet steel sides and an inverted bottom of No. 14 gage steel. These trucks are available in any required size.

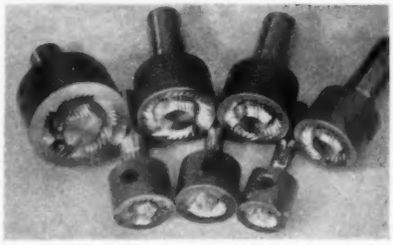
Hall "Binrack" Assembly Equipment

"Binrack" assembly units, offered by The Gordon L. Hall Co., Old Lyme, Conn., are designed to hold parts within easy reach of an assembly operator. Reaching distance is kept at a minimum and the sloping position of the bins in the racks keeps a supply of parts accessible at all times. Each bin is formed of a single piece of metal and is curved at the back to form a hook which locates it firmly in any position in the rack. Originally available only in 4 and 8 in. sizes, standard bins now are offered in 2, 3, 4, 6, and 8 in. sizes, while the racks come in 8, 12 and 16 in. lengths to accommodate bin combinations.



Severance Tube Burring Cutters

Tube burring cutters made by the Severance Tool Mfg. Co., 1520 E. Genesee Ave., Saginaw, Mich., now are available as standard cutters with standard shanks. Designed to burr both the inside and outside of tubing in one operation, these cutters are made from high speed steel,



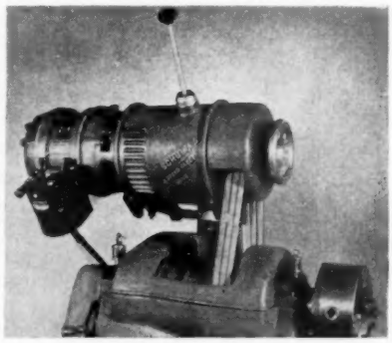
ground from the solid after hardening. Standard cutters are available for tubes ranging from $\frac{1}{8}$ in. inside diameter and 3/16 in. outside diameter to $\frac{7}{8}$ in. inside diameter and 1 in. outside diameter. The inside cutter is adjustable in or out to decrease or increase the relative amount of chamfer between the inside and outside of the tube.

"Ipco" Acid Mask

Protection to the eyes and face from acid splashes is provided by the nitrometer-acid mask developed by Industrial Products Co., 704 W. Somerset St., Philadelphia, Pa. This mask, weighing approximately 14 oz., is formed of sheet aluminum and is channeled to allow for a clear cellulose acetate window measuring approximately 7x9 in. This window easily is replaced without the use of tools. Head gear is of black vulcanized fibre and is adjustable to various head sizes. Friction hinge joints permit the wearer to raise the mask over the head.

Blackstone "Schultes" Motor Drive Unit

One lever on the Schultes motor drive unit offered by Blackstone Tool & Mfg. Co., 10541 Gratiot Ave., Detroit, Mich., provides four driving speeds to the machine tool on which it is mounted. The unit is reversible with all four speeds. It is adapted to flat belt, V-belt, chain or direct drive. A two-speed motor may be used to provide eight drive speeds. Cradle mounting of the unit permits rotation of the drive to place the gear shift lever in the most convenient position. Unit also is reversible for right- or left-hand drives. These drives are available in seven sizes, ranging from 1 to 10 hp.



Milburn Type OM Paint Spray Gun

Equipped with a hollow air atomizer head which discharges air from jets in side wings, the Type OM paint spray gun offered by The Alexander Milburn Co., 1416 W. Baltimore

St., Baltimore, Md., also is equipped with an integral fluid nozzle and cap. The atomizer head revolves around the fluid nozzle cap for vertical or horizontal spraying.

Fluid needle in this gun is made of stainless steel, as are the nozzle and cap. Fluid and air connections, with positive lock nuts, are replaceable and interchangeable, eliminating the need for adaptors.

"Timeter" Counter

National Instrument Co., 44 School St., Boston, Mass., has developed the "Timeter" electrically operated counter for connection across the terminals of any electric device or motor-driven machine. A small slow-speed, self-starting synchronous motor drives a set of numbered wheels through an oil inclosed gear train and starts and stops automatically with the device or machine so as to indicate the total hours of operation. Maximum registration is 99,999.9 hr. The unit also can be supplied to read minutes and tenths.

Norton Metallic-Bond Diamond Wheels

A special alloy metal is used to hold the diamond particles securely, yet allow just enough wear to keep the wheel free-cutting, in the metallic-bond diamond grinding wheel announced by Norton Co., Worcester, Mass. In this wheel, the diamonds are imbedded in solid metal, the entire rim being one homogenous piece. This eliminates any joint between the diamond impregnated grinding surface and the balance of the rim that might cause premature breaking away of the abrasive material.

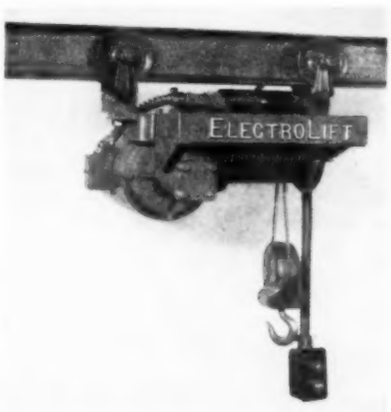
Abrasive "Red Streak" Wheel Flanges

Two circular steel flanges or plates permanently imbedded and bonded into the sides of large hole resinoid bonded wheels for rough snagging operations are featured in the improved snagging wheels offered by Abrasive Co., Div. Simonds Saw & Steel Co., Tacony and Fraley Sts., Philadelphia, Pa. Identified as "Red Streak" flanges, these units are

claimed to reduce wear on the mounting flanges and mount center and to provide a more perfect fit. These flanges now are available in wheels measuring 24 in. in diameter by 3 in. thick with a 12-in. hole.

Electro-Lift "Midget" Electric Hoist

Similar in design and construction to larger hoists made by Electro Lift, Inc., 30 Church St., New York,



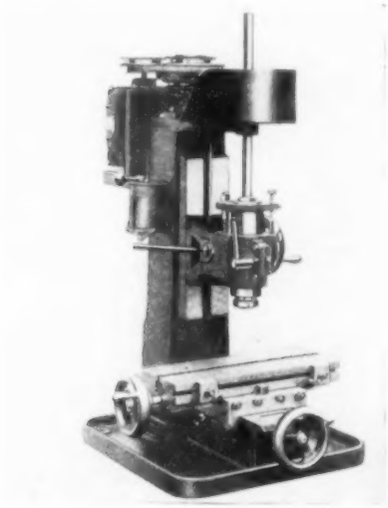
N. Y., the "Midget" hoist has a worm drive and uses steel cable. Motor is directly attached to the hoist frame and the hoist has close headroom between the hook and overhead track. Six sizes are available, with capacity ranging from 125 to 500 lb. Lift ranges from 12 to 30 ft. and speeds can be 30 or 60 ft. per min.

G. E. Improved Automatic Switch

Provided with an all-glass cover to facilitate easy inspection, the Type TSA-14 automatic time switch announced by General Electric Co., Schenectady, N. Y., features a contact-making mechanism which is driven through the spur gear train by a Telechron motor. Dial of the instrument is marked in "per cent of total time." Percentage of "on" time may be varied by the user merely by rotating the dial until the desired percentage is indicated.

Linley Improved Vertical Bench Miller

The high-speed vertical bench miller developed by Linley Bros. Co., 581 Fairfield Ave., Bridgeport, Conn., and previously described (*A.M.*—



Vol. 81, page 813) now is available with a screw-fed micrometer quill. This quill is said to assure smooth boring to any predetermined depth up to 3 in. A depth stop gage is located in front of the quill.

This bench miller is driven by a ⅓ hp., 1,725 r.p.m. ball-bearing vertical motor mounted at the rear of the column. Table has a 14½ x 5½ in. working surface. Eight spindle speeds ranging from 275 to 4,250 r.p.m. are provided. Sliding head has a movement of 8 in.

White Water-Soluble Aluminum Paint Paste

A water-mix aluminum paint paste having all the properties of other types of aluminum paint has been announced by H. Kirk White & Co., Inc., 111-115 Second St., Oconomowoc, Wis. It is claimed that this paint will not discolor on hot surfaces and may be applied while surfaces exceed 400 F. on boilers, radiators and other surfaces. It can be used on moderately wet surfaces. This paste is made with a varnish and oil base and includes materials to make them water soluble. When dry, the paint becomes insoluble to water.

Warren Improved Pulley Cover

Warren Pully Cover Co., 15 Union St. Lawrence, Mass., has announced the development of a "special process" pulley cover which remains in liquid condition and does not have to be heated before application. It is applied with a brush and two coats are said to be sufficient to give an adequate, adhesive surface to any pulley.

T-J Intensifier

A compressed air booster or intensifier, offered by the Tomkins-Johnson Co., Jackson, Mich., is arranged to raise air from 80 lb. per sq.in. to 400 lb. per sq.in. Five cubic inches of compressed air at 400 lb. pressure is developed at each 30 in. stroke of the cylinder. Air from the unit is piped into a tank from which it goes to the equipment being supplied. Incorporated in this intensifier is a remote control valve system.

P-B Ball Bearing Roller Conveyor

Tube, bearings and frame rail of an improved roller conveyor, announced by Palmer-Bee Co., Detroit, Mich., are of balanced design. A variety of bearing seals and adaptors are provided to meet all types of operating conditions. Frame rails may be of angle, channel or flat bar construction. Three types of bearings are employed: commercial ball with capacities from 60 to 4,500 lb. per roller; precision tapered roller with capacities from 1,000 to 12,000 lb. per roller; and precision ball bearings, with capacities from 1,000 to 8,000 lb. per roller.

Shakeproof "Hi-Hook" Thread-Cutting Screw

Developed expressly for plastic materials, the "Hi-Hook" thread-cutting screw announced by Shakeproof Lock Washer Co., 2501 N. Keeler Ave., Chicago, Ill., has a double width slot which gives an acute cutting edge. This is claimed to cut a clean, sharp thread in all types of plastic composi-

The "HUSKY"
DUMORE
Silver ANNIVERSARY
1913-1938
FOR TOUGH JOBS IN TIGHT SPOTS
The automotive industry is almost unanimously in accord on one point . . . the use of Dumore No. 9 Hand Grinders in their tool and die rooms. That's because this versatile tool had the stamina to stand the rigors of rough, heavy work . . . yet compact and handy enough to get into cramped quarters. The No. 9 is powered by a 1/5 h.p. Dumore Universal motor, with built-in air filter, and is available with side or end handle. ● Check these Dumore features against any other hand grinder before you buy: Armature dynamically balanced to eliminate vibration . . . windings pre-expanded, then sealed to prevent centrifugal "breathing" . . . commutator ground concentric with bearings for longer brush life . . . armature leads swaged to the commutator for 100% contact (by special Dumore process) . . . motor run-in to seat brushes . . . and the tool inspected 5 times in manufacture. Dumore Distributors will gladly demonstrate the No. 9 or any other Dumore tool. Write for facts today.
THE DUMORE CO., Dept. 138G
RACINE, WISCONSIN
DUMORE
PRECISION GRINDERS

tions, both molded and laminated. Since the screw cuts a standard thread, it may be replaced, if necessary, by a conventional machine screw of the same size without damaging the tapped hole.

Iding Abrasives

Two abrasives, specially developed for use with Iding polishing cements, are offered by M. P. Iding Disc Grinding Compound Co., Inc., 3534 W. Pierce St., Wilwaukee, Wis. "Idilite", an aluminum oxide abrasive, is offered in two types, the ET type consisting of etched grains and is said to possess high capillarity and sharp-cutting qualities. The NT type of non-etched grains possesses long-wearing qualities and produces brighter finishes when used with cements. The silicon carbide abrasive, "Idilion", is particularly adapted for polishing grey iron of all kinds.

N. Y. Crepe-Finish Package Conveyor Belt

Finished with a special crepe cover on the carrying side, an improved conveyor belt offered by New York Belting & Packing Co., 1 Market St., Passaic, N. J., is capable of carrying packaged material at a greater degree of incline than normally is used in regular conveyor work. While it provides the necessary roughness, design is said to be such that it is cleaned easily. This belt is furnished in 28 and 32 oz. duck, with a minimum thickness of the top cover of $\frac{1}{16}$ in. This may be increased as required.

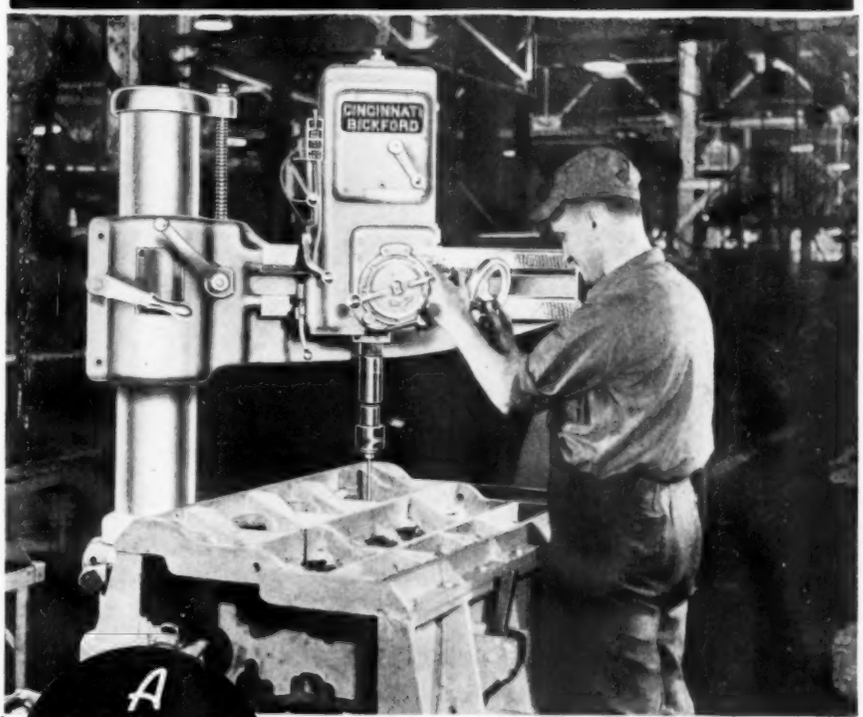
Fansteel "Fanite" Brazing Metal

Especially recommended for the brazing of tipped carbide or hard metal cutting tools, "Fanite" brazing metal developed by Fansteel Metallurgical Corp., North Chicago, Ill., can be used for brazing dissimilar metals or alloys under conditions where the brazed joint is subject to heavy loads. This material is claimed to hold a plastic stage, as it cools, for a time interval sufficient to allow the contraction of the dissimilar metals to reach a normal stage. It is intended for use in a controlled atmosphere furnace at temperatures from 1,950 to 2,100 F. It is handled with the same equipment and technique as copper. "Fanflux" for use with "Fanite" is made in two grades, one for use with metals on which the braze flows easily and the other for metals difficult to "wet." An intermediary flux can be obtained by mixing the two grades.

P & H "Harstain" Smootharc Electrode

Designed for welding chrome-nickel stainless steel, the Smootharc "Harstain" welding electrode announced by Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis., has a special coating to give maximum arc stability and to protect the metal against oxidation or atmospheric contamination. Manufactured in sizes from $\frac{3}{32}$ to $\frac{1}{4}$ in. diameter, this electrode is available in standard lengths of 12 in. Base metal contains 19 per cent chromium and 9 per cent nickel, while the carbon content of the base wire is below 0.08 per cent to insure high resistance to corrosion. Columbium is added to the base metal to prevent carbide precipitation.

CINCINNATI BICKFORD



A New SUPER SERVICE RADIAL

. . *but* already on the job reaming and tapping at Caterpillar Tractor Co.

2½' SENSITIVE
HIGH SPEED
7½" DIA. COLUMN
1-HP. DRIVING MOTOR
AUTOMATIC OILING
ANTI-FRICTION
THROUGHOUT

The machine shown—one of 13 of this size and type in a modern tractor plant—is reaming holes and tapping holes in straight side of 4 cylinder 3¾" bore tractor cylinder blocks. The column of the drill which is 7½" diameter, is mounted directly on the fixture.

Acceptance of these New Super Service Radials by this leading manufacturer for important production work is definite recognition of Cincinnati Bickford quality and the profitable, fast production which characterizes the operation of all Super Service Radials throughout the metal working industries.

Get all the details concerning these new profit makers in hole production. Write today.

The CINCINNATI BICKFORD TOOL COMPANY
OAKLEY CINCINNATI OHIO

TALKING SHOP

Education Neglected

Back in the days when we were being taught things instead of learning things we remember that metallurgy was a mysterious subject studied by a select handful over in the Chemical School. We were definitely mechanical engineers and were considered peculiar by our classmates if we signed up for any course in metals. A shop superintendent friend of ours was complaining that he had had to get all of his knowledge of metals out of books at night since leaving school. He said that more and more the job of every engineer was to understand metallurgy and the job of every production man required an extensive knowledge of practical metallurgy for best production results. If something hasn't been done about it since our time, he wants practical metallurgy made a compulsory subject in the education of every engineer in every school at least to the extent that any information required in future practice would be comparatively easy to grasp.

Production Costs Cut with Certified Alloy Steels

You can depend on better results in less time when your heat treater is guided by the Ryerson alloy data charts. These charts show him the exact properties of the steel with which he is working and tell him how to get the desired results. He does not have to test. He takes no chances. Spoilage is eliminated and a sound dependable job of high accuracy and uniformity is assured.

In addition to saving in production costs, the Ryerson Certified Alloy plan benefits the Purchasing Department as they can keep a detailed record of the exact analysis of every alloy purchased. Thus it is possible to duplicate particularly desirable close range specifications on repeat orders.

The Metallurgical Department is benefitted too for they can call for any reasonable physical requirement and be sure the Heat Treater can produce the desired result.

Ryerson Certified Steels also include carbon, tool and stainless steels that meet definite quality standards. They offer many advantages to steel users. Let us tell you the complete story. Write for booklet.

JOSEPH T. RYERSON & SON, INC. *Plants at:* Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON *Certified* STEELS

Nothing To Do

We visited a shop superintendent the other day who seemed to us remarkably free from work and worry. He took us all around the plant stopping only now and then for a word or two. Yet, there seemed to be no other bosses walking around. In fact, we found that as far as working was concerned you couldn't tell the group boss from the rest of his men. We were told that he only assumes authority when something has gone wrong with the production system or parts are missing in his section. The whole shop is laid out for orderly and continuous production and attention is called only to the unusual case when supervision is necessary. The superintendent's clerk does all the office paper work and the men are trained in handling their own and shop paper work. The clerk's power to OK saves a lot of the superintendent's time.

He had one idea that appealed to us. If a call comes in on the telephone and his presence is requested in some department, the clerk takes the message immediately thus relieving the phone for other use. The clerk announces through a mocrophone on his desk which is connected to loud speakers in the various departments, "Superintendent wanted, Section X." The superintendent then walks from the section he is into Section X without returning to the office or stopping to telephone as he would if a buzzer call were used.

Small Tool Savings

We sat in on a chin-fest of salesmen of small tools the other night. The general consensus of opinion of this group was that even some of the best plants were wasting money on their small tools because of faulty grinding practice and general inexpert attention of the men on the job. It reminded us of a conversation we had with the president of a reamer company.

With all the special reamers of today it is as much of a headache to keep them running as it is to design them in the first place. Maintenance of the proper grind plus proper lubrication and cooling has as much to do with the success of the tool as its original engineering. The particular

reamer company in question persuaded one of its automotive customers to select one of the older experienced men who could not keep up the production pace anymore. This man was instructed by the reamer manufacturer in the proper handling of tools. Not only was the amount of work per grind and per tool increased but the older man with his experience served as a specialist who not only kept the tools properly ground but also kept his eye on the general all-around efficiency of the tools and the machines in which they were used.

Old Stuff

A machine shop down the street had a man who had reached the age of 72. He was still going pretty well except that he couldn't do the necessary lifting around the shop. The company retired him at half pay. However, as his home was near the plant the men would come to him several times a week and ask his advice on problems that had come up in the shop. Some of his solutions saved the company money for which he was given extra pay. It got so that his experience was being called on almost every day so that he had made another job for himself as company consulting engineer.

Spacing to 2/100,000 Inch

The average toolmaker has an idea that he knows fine work and extra fine measurements. But making tools for, or measuring the filaments used in Mazda lamps might stump him. In the Westinghouse 6-watt lamp for example, the tungsten filament is coil spring with 2,000 turns to the inch. And no contact between the turns is permissible. In fact the tolerance of the "lead" of this spring is 0.00002 in. It's almost like cutting a thread 2,000 to the inch and checking the lead to the figure given. And not on an expensive job but for a product that sells for a few cents!

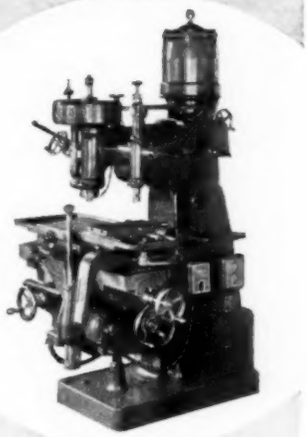
NEW BOOKS

MECHANICS OF MACHINERY. *By C. W. Ham, professor of machine design, University of Illinois, and E. G. Crane, Western Electric Company. 476 pages, 6 x 9 in. Cloth-board binding. Indexed and illustrated. Published by the McGraw-Hill Book Company, 330 West 42 St., New York, N. Y. Price, $4.00*

This volume is a revision of a text book which has been used successfully by the authors and others during the past ten years. As its name indicates, the treatment covers such subjects as cams, gearing, trains of mechanism and kinematics; in short, the applications of mechanics to the practical problems of machine design. In revising, the authors have strengthened their work by the inclusion of new material and the omission of old. They have added a number of new problems for drafting-room work selected to illustrate fundamental theories. All problems have been grouped in a sub-division at the end of the book.

ARC WELDING AND HOW TO USE IT. *Revised edition. 340 pages, 5½ x 8½ in. Illustrated. Fabricoid binding. Published by Hobart Bros. Company, Canal Lock Square, Troy, Ohio. Price, $1.50 in the United States.*

Divided into six sections, the following subjects are discussed in this



Blue glass bottles are familiar sights in drug stores where they are sold in quantities with contents that are good for what ails you. A large part of the product of Maryland Glass Corp. consists of blue glass bottles of the characteristic rich, deep color. The molds for many of them are made on Gorton Duplicators. For the reason, let's take a look in the time book of the Mould Shop foreman on a typical case like this 32 oz. Milk of Magnesia bottle.

The moulds for this bottle were produced on the Gorton Duplicator in half the time formerly required.

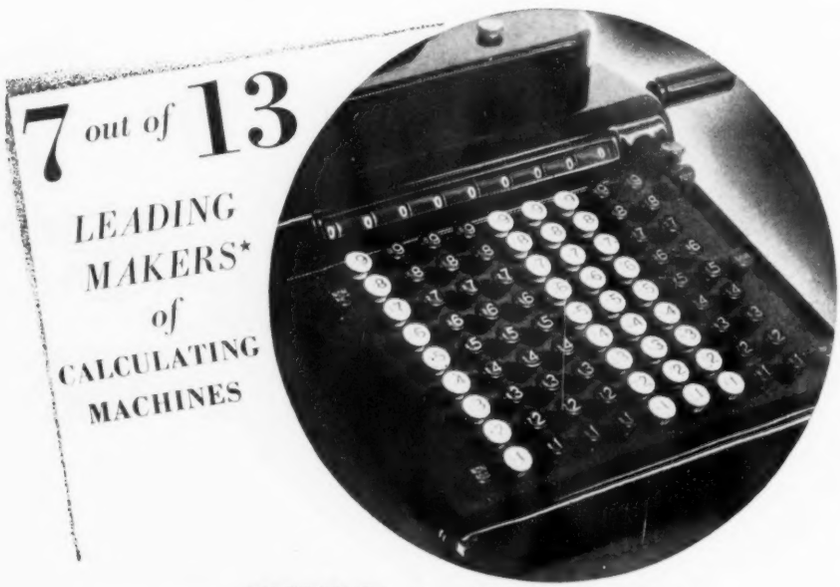
	Produced on a Gorton Duplicator			By Previous Methods	Time Saved
	Duplicator Time	Hand Work	Total		
Bottle Moulds, 9 halves	28 hrs.	87 hrs.	115 hrs.	182 hrs.	67 hrs.
Bottom Plates, 4	4	12	16	27	11
Blanks, 9 halves	14	21	35	122	87
Total Time	46 hrs.	120 hrs.	166 hrs.	331 hrs.	165 hrs.

GEORGE GORTON MACHINE CO.
1103 13TH ST., RACINE, WIS.

new edition of the Hobart Arc Welding Manual: general information on the development of arc welding; weldability of metals; applications or uses; various types of joints and welds; welding rods; welding speeds and costs; a series of practical welding lessons; information on carbon arc welding and cutting, with instructions for welding non-ferrous metals; special information of interest to engineers, designers and supervisors; brief description of modern welding equipment. Photographs and line drawings are used profusely to illustrate points brought out in the text.

THE SENIORITY PRINCIPLE IN EMPLOYMENT RELATIONS. *Preliminary Report No. 53, prepared by Industrial Relations Section, Department of Economics and Social Institutions, Princeton University, 31 mimeographed pages, 8½ x 11 in. Published by Princeton University, Princeton, N. J. Price, 50 cents.*

In order to learn more concerning current policies, practices and attitudes in regard to the seniority principle, the Industrial Relations Section of the University has made a brief survey of the field. The summary of this survey contained in this report is descriptive rather than analytical, since sufficient experience is not yet available for the formulation of conclusions. The summary has been prepared to call attention to the diversity of practices and judgments, not only among employers, but also among trade union leadership.



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For instance, on such work as the removal of quenching oils, tumbling of parts to remove hardening salts, cleaning frames before Bonderizing, cleaning parts before painting or plating, Oakite materials are being daily applied in the plants of SEVEN of the THIRTEEN manufacturers of adding and calculating machines rated AAAA in Thomas' Register.

As in other plants where mass production must be achieved, where cleaning speed and uniform effectiveness must go hand in hand, Oakite materials are proving their worth in lessened time delays, fewer rejects and lowered unit costs.

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MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

TRADE PUBLICATIONS

ALLOY STEELS Bliss & Laughlin, Inc., Harvey, Ill., has announced publication of a four-page bulletin discussing the uses of various types of alloy steels.

ANNEALING FURNACES Form No. SC-78, a four-page bulletin published by Surface Combustion Corp., Toledo, Ohio, discusses the features of a number of controlled atmosphere annealing furnaces for non-ferrous metals. Illustrations show a number of continuous-type furnaces as well as smaller batch-type units.

ANNUAL WAGE "How Feasible is an Annual Wage for Labor?" is the title of a 16-page Bulletin in which A. W. Rucker and N. W. Pickering discuss a recent study of this question. This is booklet No. 27 of a series prepared and distributed by Farrl-Birmingham Co., Inc., Ansonia, Conn.

BEARING PROTECTION Norma-Hoffman Bearings Corp., Stamford, Conn., is distributing a circular discussing methods of safeguarding ball bearings during the interval between manufacture and application.

BELTS Bulletin No. 6869, offered by The Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J., describes the construction and applications of Condor "Whipcord" endless belt.

CUTTING TOOLS "Haynes Stellite-2400 Metal Cutting Tools" is the title of an illustrated folder discussing the uses of Stellite-2400 and listing prices for tool bits and tipped tools. This booklet also contains recommendations for grinding this material. Copies can be secured from the Haynes Stellite Co., 30 E. 42nd St., New York, N. Y.

DRILL PRESSES No. 18 drilling machines manufactured by Buffalo Forge Co., 448 Broadway, Buffalo, N. Y., are described in Bulletin No. 3123, recently announced. These drills are available in bench and floor models.

DRUM SWITCHES Bulletin No. GEA-2716 offered by General Electric Co., Schenectady, N. Y., discusses the features of CR3108 and CR3118 d.c. cam-type drum switches for industrial applications.

ELECTRIC MOTORS Bulletin No. M-2 announced by Harnischfeger Corp., 4514 W. National Ave., Milwaukee, Wis., discusses the features of P & H convertible slip ring motors. Standard conversions for four types of service are described.

FLEXIBLE TUBING A mailing folder now being distributed by Resistoflex Corp., 370 Lexington Ave., New York, N. Y., discusses the features of "Resistoflex PVA" tubing for a wide range of applications.

GEAR BURRING Features of the "Red Ring" gear tooth burring machine are discussed in a four-page bulletin offered by National Broach & Machine Co., 11457 Shoemaker St., Detroit, Mich.

HEAT-TREATING The No. 166-BC reciprocating full-muffle continuous hardening machine is described in a bulletin offered by American Gas Furnace Co., Elizabeth, N. J.

INCLINABLE PRESSES "Junior" inclinable presses are described in a four-page bulletin offered by Perkins Machine Co., Warren, Mass.

IRON-NICKEL ALLOYS Data Sheets Section IV, No. 1, entitled "Iron-Nickel and Related Alloys of the Invar and Elinvar Types" for insertion in the "Nickel Alloy Steels Data Book" is being distributed by the International Nickel Co., Inc., 67 Wall St., New York, N. Y.

LEDLOY BARS A four-page bulletin published by Wyckoff Drawn Steel Co., Pittsburgh, Pa., discusses the features of Wyco "Ledloy" cold drawn steel bars, which are available in all standard S.A.E. analyses.

LINESTARTERS Price List No. 11-200, announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., discusses the features of "Deion" non-reversing linestarters and lists prices for various arrangements.

MATERIALS HANDLING "Planned Unit Loads" is the title of a four-page bulletin, Form. No. G3-38, discussing the use of tramrail equipment for handling unit loads, offered by the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

METAL SAW The improved 8-in. cold metal sawing machine offered by Porter-McLeod Machine Tool Co., Inc., Hatfield, Mass., is described in a recently published four-page bulletin.

MILLING MACHINES Features of Dual-Control and standard type milling machines are discussed in a 40-page booklet announced by Browne & Sharpe Mfg. Co., Providence, R. I. Universal, plain and vertical machines are described.

PLATFORM TRUCKS Catalog No. 52-32, offered by the Fairbanks Co., 393 Lafayette St., New York, N. Y., describes a full line of platform and special hand trucks for a wide range of industrial applications.

PRODUCTION TOOLS Catalog No. 400, offered by Scully-Jones & Co., 19th and Rockwell Sts., Chicago, Ill., is a 320-page engineering manual listing standard and special high-

Spring tempered
COLLETS
Order From Stock
Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 100B) they may be ordered for immediate delivery from the following stocks:—
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DETROIT
Charles A. Strelinger Co
149 E. Larned Street
BOSTON
Rivett Lathe & Grinder Inc
18 Riverview Road, Brighton
RIVETT
LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

production tools for drilling, tapping, milling and boring operations.

PORTABLE DRILLS Catalog No. 638, an 8-page bulletin offered by Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill., discusses the features of "Red Streak" portable electric drills and lists a number of standard models.

SHEARS Power-operated circle shears, ring shears, flangers and slitters are described in bulletin No. 70-D announced by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y. Ilustrations show various types and sizes of these machines, specifications are tabulated.

RIVETERS Bulletin No. 43, a 12-page booklet offered by Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago, Ill., discusses the features of "Allen" portable and stationary pneumatic riveters.

RUST PROOFING Applications of the "Parkerizing" process for rust proofing steel parts are discussed in a 16-page bulletin issued by the Parker Rust-Proof Co., Detroit, Mich.

SCREW MACHINES "It Pays to Replace Old Automatic Screw Machines" is the title of a bulletin discussing the features of new screw machines offered by Brown & Sharpe Mfg. Co., Providence, R. I.

STORY OF SCOVILL "Masters of Metal" is the title of a 20-page, fully illustrated bulletin discussing the history and facilities of the Scovill Mfg. Co., Waterbury, Conn., and its divisions.

SURFACE ROUGHNESS The "Profilometer," an instrument for measuring surface roughness, is described in a four-page bulletin being distributed by Physicists Research Co., 337 S. Main St., Ann Arbor, Mich.

THREADING The "Landmaco" quadruple-head threading machine is described in a four-page bulletin announced by Landis Machine Co., Inc., Waynesboro, Pa. The four heads of this machine easily can be operated by one person.

TOOLS Catalog No. 26, a 282-page booklet listing more than 3000 improved tools and standard items has been published by The L. S. Starrett Co., Athol, Mass. The various sections are indexed and illustrations show precision tools in use.

TRANSPORTATION A 32-page booklet announced by Elwell-Parker Electric Co., Cleveland, Ohio, illustrates leading types of models of Elwell-Parker trucks, tractors and cranes. Illustrations show mechanical details of these units.

TRUCKS General Catalog No. 50, an 18-page bulletin announced by the Baker Industrial Truck Div., Baker-Raulang Co., 2168 W. 25th St., Cleveland, Ohio, discusses the principal features of various types of elevating, fork, platform and "Hy-Lift" trucks, tractors, cranes and special units. Illustrations show typical uses of these units.

UNIVERSAL GRINDERS Bulletin No. G-414 describing the Cincinnati 12 and 16 in. universal grinding machines now is being distributed by Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati, Ohio. Illustrations show the machine and various attachments.

V-BELTS Bulletin No. 6868 now being distributed by The Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J., discusses the functions and construction of "Condor" whipcord V-Belts.

NO QUESTION about Oilgear Surface Broaching Machine PERFORMANCE
•One or more pieces finish-broached simultaneously
•Highest production at close tolerances
•Each unit complete and self-contained
•Single lever, semi-automatic control
•Automatic full interlock of broach and shuttle tables
•Welded all-steel construction
•6, 10, 16, 20 ton capacities
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